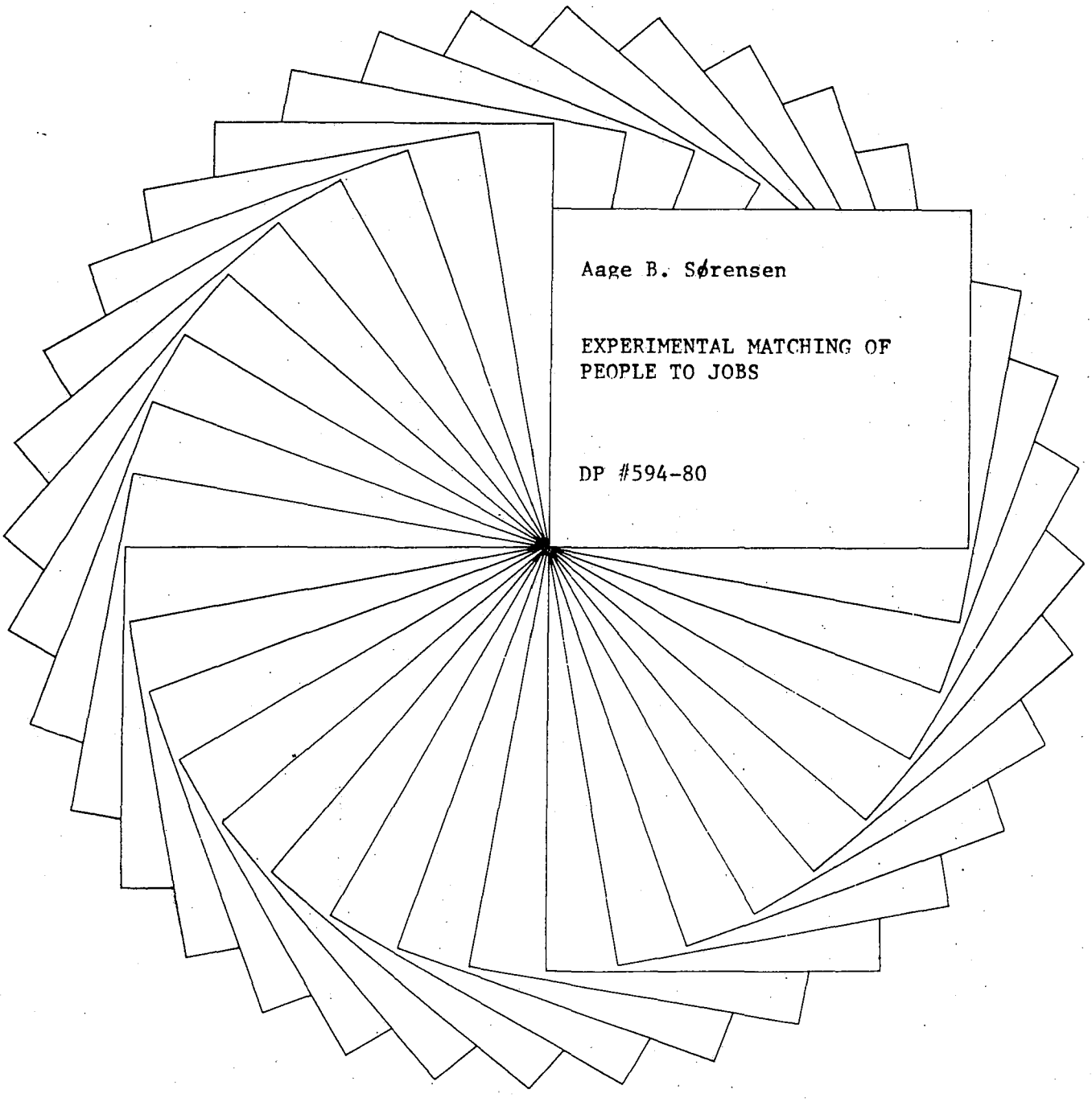
University of Wisconsin-Madison

Institute for Research on Poverty

Discussion Papers



Experimental Matching of People to Jobs

Aage B. Sørensen
Institute for Research on Poverty
University of Wisconsin-Madison

February 1980

Funding for this research was provided by Contract #20-55-79-30, the Equal Opportunity Pilot Programs evaluation, of the U.S. Department of Labor. The opinions expressed are the author's.

ABSTRACT

The paper proposes a research program to investigate the effect of job characteristics, in particular career ladders on the work orientation and employment behavior of people. Systematic planned variation of jobs with random allocation of people to jobs is proposed as part of the EOPP project.

Experimental Matching of People to Jobs

The main goal of President Carter's 1977 Program for Better Jobs and Incomes (PBJI) and of similar programs is to expand the employment opportunities available to primary earners and eventually to encourage their employment in regular, nonsubsidized jobs in the private and public sectors. Such programs must be measured by two yardsticks: First, the degree to which they achieve their intended effects on the employment behavior of participants; and second, the extent of their effects on nonparticipants--that is, their larger labor market impacts. The research proposed here primarily addresses the question of how a program like PBJI can affect employment behavior.

Employment behavior will change if: (1) employment opportunities are both expanded and their attractiveness increased; and (2) if attitudes toward work and employment change because of the employment experiences provided by the program. Just as a number of different aspects determine the attractiveness of jobs and the satisfaction--and hence employment decisions--of job holders, so, a number of different characteristics of jobs can produce changes in work orientation. The Employment Opportunity Pilot Project (EOPP) that is currently under way will offer jobs that show some natural variation in job characteristics related to their desirability and their effects on work orientation. There is, however, unlikely to be significant variation with respect to some of the most important characteristics determining the attractiveness of jobs and their effects on attitudes and behavior. For this reason, we offer below an experimental design for

systematic and planned variation in job characteristics, with random allocation of people to jobs in its design. We shall first justify the use of this experimental design, then discuss which job characteristics to vary. We will argue that the most promising candidate for variation is the degree to which a job is linked to other and better jobs in job EOPP ladders. Finally, we discuss how to implement the proposed experimental matching of people to jobs.

EXPERIMENTAL MATCHING

Unless a project like EOPP is wholly predetermined, variation in its characteristics is desirable, and planned variation is preferable to natural variation, for planning will ensure that the range of variation is specified, operationalized, and implemented. In a study of the importance of job characteristics for employment behavior in programs such as EOPP planned variation may be necessary, for the program may likely lack natural variation. Variation in wage rates may be small or nonexistent, many of the jobs created by the program may be temporary in nature and most jobs likely will be uniformly attractive (or unattractive). In fact, unless variation in job characteristics is deliberately instituted, most of the jobs offered may be low-status jobs that will be seen as dead-end employment opportunities. Thus, it is important to design a national program so that the above description will not be the case. We propose below to show the benefits of such a program and how it may be done.

In principle, planned variation need not involve random allocation if a well-specified structural model is available to explain the impact of the variable being controlled in the planned variation on the outcome variable.

Although it is known that there is a high degree of association between job characteristics and behavior such a model is not yet available to clarify the interaction between the two. There is a similar association between the characteristics of job incumbents relevant for their employment behavior and the characteristics of the jobs themselves. Some of this association may result from self-selection, some from the impact of jobs on people; from the fact of the association alone, the direction of causality cannot be ascertained.[1] Thus, to provide firm evidence of the impact of jobs on people, we do need random allocation to remove the collinearity between people and job characteristics.

There are numerous characterisitcs of EOPP that could be subject to systematic planned or experimental variation. It is certainly feasible to vary such administrative practices as: whether or not EOPP jobs are restricted to the primary earner in the family; period of unemployment and job acceptance procedures. The reason that we concentrate on experimental variation in the characteristics of the jobs themselves is that if subsidized employment programs are to have a long-run effect in reducing poverty, job characteristics will be the most potent variables. Often subsidized employment programs are ciritcized for offering only menial jobs while never effectively changing the welfare of participants. But such programs, even though they may provide only low wages, need not offer only menial jobs, or, if so, their jobs may have compensating characterisitcs, particularly as stepping stones to stable and rewarding career patterns. Thus, careful planning may create meaningful employment opportunities that effectively increase the welfare of participants. But these opportunities will only emerge through the experimental matching

of people to jobs that we propose; otherwise, we will never effectively be able to control for self-selection. Systematic variation of administrative procedures may provide knowledge useful for the detailed planning of jobs programs, but only the experimental matching of people to jobs can provide the knowledge of the effect of work on people, knowledge that is of the highest relevance for policy.

In a later section we describe the procedure we propose for implementing experimental variation. First, we need to justify more fully the importance of job characteristics, in particular the career opportunities offered by jobs.

JOB CHARACTERISTICS AND JOB ATTACHMENTS

An abundance of sociological and social psychological research shows that several characteristics of jobs are relevant for peoples' employment decisions. Below, we examine some important characteristics that can and should be measured and that may be subject to systematic variation.

In particular, economic and sociological theory and research suggest that the characteristics of jobs especially relevant for employment decisions are those bearing on future career prospects, for they not only affect the individual's immediate decision making, but may also change people's work orientations and further employment behavior. Yet although research strongly suggests work orientation and employment behavior are associated with the characteristics of jobs, so far no opportunity has arisen for experimenting with varying employment experiences in order to assess the causal effects on work orientation and employment behavior. We shall examine this issue below.

Jobs and Employment Behavior

Most economic research on employment behavior focuses on the wage rate as the only variable of interest. None denies that other job

characteristics may be relevant, but, operationally, the wage rate dominates.

The wage rate is an obvious candidate for systematic variation if it adequately summarizes the benefits derived from a job. Because it can be manipulated without changing other characteristics of jobs, it is presumably an operationally easy variable to control. Nevertheless, we do not propose the wage rate as the primary candidate for variation because we believe it will be difficult, within the framework of the EOPP program, to obtain significant variation in the wage rate. Furthermore, the wage rate, at any given point in time, is not the most significant characteristic of a job, as far as employment decisions are concerned. Standard human capital theory, however, sees the lifetime earnings stream as the decision variable, while sociological and social psychological research also points to this as having a decisive effect on career trajectories and their variation.

That characteristics other than the wage rate are important determinants of employment behavior has been shown directly in recent research on job mobility and indirectly in research on job satisfaction and its determinants.

Research on job mobility focuses on the rate of job shifts (the rate at which people leave jobs) and its relationship to the characteristics of individuals and their jobs (Sørensen, 1974; Tuma, 1976; Sørensen and Tuma, 1978). This research shows, not surprisingly, that the better the job the less likely the incumbent is to leave it. But it shows also that the quality of the job, as measured by sociological scales of occupational prestige and status, is a more important determinant of the rate at which people quit than is the wage rate. Sociological measures of occupational status, obtained by rankings of occupations that reflect a number of

dimensions (security, presitge, interesting work, and autonomy) are remarkably stable over different population groups (Goldthorpe and Hope, 1972).

Indirect evidence for the importance of characteristics other than the wage rate is provided by research on job satisfaction. A person's satisfaction with his job is obviously linked to his desire to leave it to search for a better job, a search that may involve a period of unemployment. An abundance of research in this area, in particular the large-scale Quality of Employment Surveys conducted at the University of Michigan, shows that job satisfaction, influenced by several dimensions of work, is above all affected by its intrinsic benefits (interesting work, autonomy in execution, ability to use and develop abilities) and extrinsic rewards (pay and fringe benefits, career opportunities). Convenience (easy access to job, good hours) and relationships with co-workers were less important.

This research also shows that people differ in the value they attach to different dimensions of work. For example, women tend to emphasize intrinsic aspects of work more highly than do men. Moreover, people, when free to choose, will choose the work that realizes intrinsic values. But these values are not divorced from the actual benefits provided by jobs. Research reveals that people tend to aspire towards that which they have a reasonable chance to obtain--a significant fact for the research proposed here.

The evidence for this association between aspirations and actualities is especially abundant for work aspirations and has been established for all age groups. Those who are likely to obtain good jobs, stable employment, and professional careers will aspire to them, while those who are not likely to

obtain these benefits will not aspire to them, but will de-emphasize work and plans for stable employment in the future.

The mere ability to plan for a future that gives some hope of obtaining rewarding work is evidently a necessary condition for aspiring to such work, just as some security from unexpected dismissal is a basic condition for a sense of control over one's work life. Thus, jobs that offer future rewarding work experiences are desirable jobs even if they offer a low starting wage rate. Furthermore, such jobs may be those especially likely to direct individual job attitudes and work orientations toward stable employment behavior and high future earnings. For these reasons, we propose job security and access to job ladders as the main candidates for experimental variation in the matching of people to jobs.

Job Ladders and Career Opportunities

A job, A, may be linked to another job, B, so that people occupying A have a greater probability of moving into B than do people not occupying A. The links between jobs may be organized in strict promotion hierarchies so that access to any job except the entry job requires that one occupy all preceding jobs in the hierarchy; eventually, everyone theoretically will move through all jobs. Job ladders may, however, also be said to exist even when there are not such formalized rules. Thus, a job structure may be considered to involve job ladders where linkages result from the fact that jobs are located at the same firm or where training on one job confers an advantage for access to other jobs.

Job ladders are an important concept in the literature on segmented labor markets and in particular on internal labor markets. Internal labor

markets are here seen to be associated with stable employment behavior and high lifetime earnings as they should be, because of self-selection and because the very existence of job ladders in those markets affects the individual's work orientation. In this respect, they contrast with external labor markets, where the opportunities for career progressions do not exist and where employment behavior is unstable.

In the sociological research on attainment, the study of job mobility and occupational mobility plays a crucial role. It reveals job structures through the career lines they create for workers. There is growing evidence (Spilerman, 1977) that these career lines depend crucially on the industrial occupational starting point of the individual.

The dominant economic labor market theory does not emphasize job structures. However, human capital theory does predict career profiles that are concave to the age axis as a result of investments in on-the-job training and the like, although it does not describe the exact mechanisms by which these career curves come about. Such curves could result from earnings increases of individuals, irrespective of the particular jobs they occupy, or from sequences of job shifts. It can, however, be shown that the same career profiles obtain with respect to occupational status (Sørensen, 1975), which is an attribute of a job, and can only be changed by changing that job. This then suggests that the mechanism by which the typical age-earnings profile comes about is a series of job shifts among jobs more or less closely linked together in career ladders.[2]

Growth in earnings that comes about through job shifts can ensue either because training in one job leads to a better job or because certain jobs are linked to jobs that provide career opportunities, even in the

absence of training. Very similar outcomes can be predicted from both of these mechanisms (Sørensen, 1977), and both reflect the operation of career ladders. The existence of these ladders means that one can, in principle, assign a number to each job that will reflect the predicted career profile of a person occupying the job as a function of the job rewards obtained at various steps in the ladder times the probabilities of realizing these ladders.

It is useful to illustrate[3] these considerations. Suppose workers care only about the expected discounted income accruing from a job. (This simplification is unsatisfactory, but allows us to focus on the issue under consideration.) For example, suppose an offer consists of an initial wage rate per hour of \$3. After two years at this wage rate, the worker will either get an increase to \$4 an hour or stay at \$3 an hour. Suppose B denotes the probability the worker will be promoted. Further assume the worker will retire after another 20 years. Given the worker works for 40 hours a week for 52 weeks a year and B = .5, the expected discounted income accruing from such an offer, V, can be written as

$$V = (3)(40)(52)\frac{1}{(1+r)} + (3)(40)(52)\frac{1}{(1+r)^2} + \frac{1}{2}(4)(40)(52)\sum_{n=3}^{20}\frac{1}{(1+r)^n}$$

$$+ (3)(40)(52)\frac{1}{2}\sum_{n=3}^{20}\frac{1}{(1+r)^n},$$

where r denotes the relevant discount factor.

To illustrate how the initial wage may not be a good indicator of the rewards from a job, consider the following two job offers:

Job Offer 1: The worker receives a wage rate of \$3.50 an hour for 2 years, i.e., \$7240 per year for 2 years. There is then a 0.5 probability that the worker will be promoted to a job paying \$4.50 an hour, and a 0.5 probability the worker will lose the job.

Job Offer 2: The worker receives a wage rate of \$w an hour for two years, and then loses this job with certainty.

Assuming a worker has 20 more years of working life remaining, the expected discounted income accruing from job offers 1 and 2 can be written as

$$V_1 = 7240\left|\frac{1}{(1+r)} + \frac{1}{(1+r)^2}\right| + \frac{8320}{2}\sum_{n=3}^{20}\frac{1}{(1+r)^n} + \frac{5200}{2}\sum_{n=3}^{20}\frac{1}{(1+r)^n}$$

$$V_2 = Z\left|\frac{1}{(1+r)} + \frac{1}{(1+r)^2}\right| + 5200\sum_{n=3}^{20}\frac{1}{(1+r)^n},$$

where Z denotes the yearly income from wage rate \$w per hour and 5200 denotes the yearly income to the worker when any job is complete.

The above two job offers will yield the same expected discounted income if $V_1 = V_2$. However, $V_1 = V_2$ if and only if

$$Z = \frac{(2+r)}{(1+r)^2}\frac{3120}{2}\sum_{n=3}^{20}\frac{1}{(1+r)^n} + 7240.$$

Hence, the above equality will depend on the wage rate \$w and the discount rate, r. Below, we present the hourly wage rate in job offer 2 that equates the rewards from the two job offers for various rates.

r	5%	10%	15%	20%
\$w that implies $V_1 = V_2$	\$7.27	\$5.93	\$5.14	\$4.64

Clearly, the initial wage rate is a poor measure of the decision variable. In addition, the solution of job offer 1 for the employment decision is magnified by the expected effect upon the individual's work orientation of having access to the job ladder associated with job offer 1.

Direct evidence for the importance of job ladders in supported employment programs comes from the Supported Work Program. Job ladders are there operationalized as "rollovers," that is, access to continued employment in the same agency. AFDC mothers held the highest percentage of such rollover jobs and were the group that did best in Supported Work. For the AFDC sample, 8.6% of those who were in the program ten or more months ended up in rollover jobs, while only 5.3% of those who left before ten months had rollover jobs, suggesting that rollover potential (job ladders) may increase program participation as well. This suggestion is confirmed by regression analysis, which finds that, controlling for other relevant variables, rollover had a significant effect on employment and labor force participation.

The results from the Supported Work program point to the importance of systematic planned variation. Overall, there were very few rollovers--only 43 cases for AFDC and 25 cases for the non-AFDC sample. Natural variation in job ladders is indeed likely to be small in programs like these.

IMPLEMENTATION

The implementation of planned variations can be broken into three sequential stages: (1) identification and measurement of relevant variables; (2) manipulation of the variation in these variables; and (3) random assignment to the different statuses.

These stages can be viewed as presenting increasingly complex implementation problems. Each step for each possible variable must be assessed in terms of the possible benefits (outlined above) and costs associated with implementation.

In some cases, one would expect the identification of jobs with career ladders to be relatively straightforward; where this is not the case, there may nevertheless be jobs that leave the employee better situated to find future employment, perhaps at higher levels. It seems useful to interview employment service people in an effort to identify such jobs.

We expect to identify at least four levels of job ladders.

1. No ladder at all, where the duration of employment is arbitrary and fixed, unrelated to the performance of the participants, and where participants are excluded from access to other jobs in the employing establishment.

2. The existence of career opportunities provided by job security and priority for hiring into other jobs in the employing establishment or in establishments linked to it. The career opportunities here come about because the participant can wait in his present job until a better job becomes available.

3. Access to preexisting job ladders that offer probabilities of promotions that are neither zero nor one.

4. Access to job ladders where promotion schedules are prescribed but where the timing of promotions may vary according to performance. This highest level of institutionalization of job ladders thus guarantees advancement, though not the rate of advancement.

One method of achieving planned, rather than natural, variation is through contractual arrangements with employers, whereby upon satisfactory completion of a specified period of subsidized employment (low absenteeism, high productivity, etc.), an EOPP participant will be hired for a regular position within the agency. A second method, which achieved some acceptance

in Supported Work, involves hiring an EOPP participant to perform a job (normally higher paying) at the lower, subsidized EOPP wage rate. The benefits to both employer and employee are obvious: the employer gets work at a rate much lower even than a normally subsidized job while the EOPP participant is able to build a work history in a job which pays a higher rate in the normal job market, thereby increasing his or her later earnings potential.

Random assignment to jobs will be the most difficult step to implement. Employers will not readily be willing to relinquish control over hiring. Some employers may be more willing than others, however, and at least an attempt should be made to sell the idea. Several methods exist for making the idea more acceptable for employers. Employers should always retain the right to veto an applicant, although if they did so too often, the purpose of the random assignment would of course be defeated. Random assignment could be softened by using it only for some portion of the participants, say every third. There might be certain jobs where random assignment would be less of an issue (only determinable through direct contact with employers). Finally, it may be possible for employers to specify relevant criteria for applicants. Matching could then be used, with random assignment from a pool (or pair) of qualified EOPP participants. How feasible matching is depends on the number of available jobs and applicants at any one time.

Planned variation in job characteristics may most simply be obtained by identifying the characteristics of existing jobs and then randomly allocating people to vacancies in these jobs. For private sector jobs, this would be combined with a voucher arrangement.

One argument against such a procedure is that it would displace workers who would otherwise seek and get these jobs. This issue of displacement is, in principle, of no concern here, since the aim is to study how job opportunities affect people, not to study the short-run labor market impacts of EOPP. But it is likely that serious practical problems will arise if good jobs with futures are to be allocated on a random basis in regular employment situations. Even if employers can be induced to go along, co-workers are likely to be dissatisified, especially if their career prospects are affected by the program. The issue is much like the one encountered in affirmative action cases; the positive achievements in that area are a hopeful sign.

The alternative procedure--creating variation in jobs established for ad hoc projects--avoids these problems, but itself faces two obvious difficulties. It may be difficult to achieve enough meaningful variation in job characteristics across ad hoc projects. Most important, if the time perspective of jobs is of most interest, ad hoc projects are not very useful, for the only way to achieve systematic variation is to set up transitions to jobs outside the project. These transitions would have to be controlled, and we would then be back to the problems described in the preceding paragraph.

But it is not impossible to vary job characteristics, in particular career prospects. Jobs with careers in protective services and education have been created in the past as PSE jobs, and this is likely to be done again. But it is, of course, important that the variation be carefully planned. In particular, it seems impossible to plan actual implementation in the abstract; close contacts with the EOPP sites appear essential in the planning period.

Over the first year of the program, experimental matching will be in the planning stages; we expect to implement it in about a year for a small number of jobs on each of the sites. We need enough jobs to give an adequate sample size for analysis but not so many that the number of people involved will affect execution of the other parts of the labor market impact study. Alternatively, we could eliminate interference in that study by using between-site variation. However, it would then clearly be impossible to have the uniform job ladder arrangements within sites that would be necessary for between-site variation.

Evidently a design that varied only the wage rate between sites might be seen as formally simpler and more appropriate, if overall labor market impacts are EOPP's only concern, and if initial wage rates are seen as the only relevant variable. However, the focus of the research that we here propose is not the immediate labor market impact of EOPP but the effect of jobs on people's work orientation and employment behavior. And we have argued that for this research objective the wage rate, in isolation, may be a poor measure of the relevant job characterisitcs.

NOTES

[1]Evidence for the effect of job characteristics on people's psychological functioning has been presented in a series of papers by Melvin Kohn and his associates. See, for example, Kohn and Schooler, 1978.

[2]It can be shown, incidentally, that the career profiles of blacks are much flatter than those for whites (Sørensen, 1975), reflecting the fact that blacks seem not to have access to jobs with job ladders above them as often as whites do.

[3]The example that follows was provided by Kenneth Burdett.

REFERENCES

Goldthorpe, J.H. and K. Hope. 1972. Occupational grading and occupational prestige. In K. Hope, ed., The analysis of social mobility: Methods and approaches, (Oxford: Clarendon). Pp. 19-79.

Kohn, M.L. and C. Schooler. 1978. The reciprocal effects of the substantive complexity of work and intellectual flexibility: A longitudinal assessment. American Journal of Sociology, 84, 211-52.

Spilerman, S. 1977. Careers, labor market structure, and socioeconomic achievement. American Journal of Sociology, 83, 551-93.

Sørensen, A.B. 1974. A model for occupational careers. American Journal of Sociology, 80, 44-57.

-----. 1975. The structure of intragenerational mobility. American Sociologcial Review, 40, 456-91.

-----. 1977. The structure of inequality and the process of attainment, American Sociological Review, 42, 965-98.

----- and N.B. Tuma. 1978. Labor market structures and job mobility. Madison, WI: Institute for Research on Poverty, University of Wisconsin-Madison, Discussion Paper 505-98.

Tuma, N.B. 1976. Rewards, resources and the rate of mobility. American Sociological Review, 41, 338-60.