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ABSTRACT

This paper analyzes the properties of the process of social and economic attainments in two contrasting situations: (1) when the process of attainment generates the distribution of attainments, and (2) when the structure of attainments is seen as exogenously determined. It is argued that the neoclassical economic theory of earnings determination corresponds to the first situation, while a model for the matching of persons to jobs (referred to as vacancy competition) corresponds to the second situation. In the neoclassical theory, change over time in a person's level of attainment is produced by changes in productive skills, while in the vacancy competition model change in attainment can only take place when a vacancy is created, irrespective of what other changes may take place in skill level. It is shown that the two mechanisms cannot be identified in cross-sectional data analysis, nor can they be identified in analysis of over-time change in attainment when time is used as a proxy for change in personal resources or job shifts. It is suggested that the most fruitful direction for research at the present time is one where different substantive implications of the two models are specified and tested. Since the two models describe how labor markets operate, future research should be directed at studying labor markets and their impact on the attainment process. (Author/AM)

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INSTITUTE FOR RESEARCH ON POVERTY DISCUSSION PAPERS

EDUCATION, THE PROCESS OF ATTAINMENT AND THE STRUCTURE OF INEQUALITY

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ABSTRACT

This paper analyzes the properties of the process of social and economic attainments in two contrasting situations: (1) when the process of attainment generates the distribution of attainments, and (2) when the structure of attainments is seen as exogenously determined. It is argued that the neoclassical economic theory of earnings determination corresponds to the first situation, while a model for the matching of persons to jobs (referred to as vacancy competition) corresponds to the second situation. In the neoclassical theory change over time in a person's level of attainment is produced by changes in productive skills, while in the vacancy competition model change in attainment can only take place when a vacancy is created, irrespective of what other changes may take place in skill level. It is shown that the two mechanisms cannot be identified in cross-sectional data analysis, nor can they be identified in analysis of over-time change in attainment when time is used as a proxy for change in personal resources or job shifts.

1. INTRODUCTION

Research on the process by which persons obtain social and economic status in society is one of the most conspicuous areas of research in contemporary sociology. Few, if any, areas of research have the coherence and cumulative nature of what has become known as status attainment research. A large number of studies has accumulated, most of them sharing the basic paradigm introduced by Blau and Duncan (1967) in their pioneering contribution. Linear structural equation models are used in these studies to represent the complex interplay between various background variables, education, and life-cycle events in producing social and economic attainment.

Despite the quantity and quality of studies performed on occupational and economic attainment, disagreement exists on how to interpret the findings of this research. This is particularly true with respect to the interpretation of the role of education in the attainment process. Though most agree that the observed association between a person's educational attainment and his/her social and economic attainment is high, considerable disagreement exists on the wider significance of this finding. Boudon (1974) and Bowles and Gintis (1976) argue, although from very different perspectives, that the findings do not imply that education is important for equality of opportunity. Thurow (1975) and Jencks et al. (1972) argue, again for quite different reasons, that the research findings do not imply that education is important for inequality of results.

Inequality of opportunity and inequality of results are different things. The concern with the role of education for inequality of opportunity addresses the issue of the extent to which education reduces rather than reinforces the association between a person's social origin and his/her later occupational and economic attainment. The concern with the role of education for inequality of results, in contrast, addresses the issue of whether education can be used to change the distribution of attainments, that is, the structure of inequality in society. In both instances the issues arise because education, among the various individual attributes relevant for attainment, is the only one that offers a potential policy instrument. The distinction between the two outcomes is important, however, since it is conceivable that education could reduce inequality of opportunity without reducing inequality of results, as well as the opposite: education may reduce inequality of results without reducing inequality of opportunity in society.

This paper will address one of these issues: the role of education for inequality of results. I will first identify more precisely the nature of the problem. Then follows an analysis of the different mechanisms that produce the observed association between education and social and economic attainment: (1) in the situation where education may be assumed to be important for inequality of results, and (2) in the situation where it is assumed that educational attainments cannot influence the degree of inequality of results in society. Finally, a brief review of the bearing of existing research on the issue will be presented.

Sociologists share with economists the concern for one aspect of the attainment process, that is, income attainment. Less empirical

research has been carried out by economists, and they have tended to ignore the question of inequality of opportunity altogether. However, neoclassical economics provide a powerful theory for the mechanisms that translate education (and other personal characteristics) into attainments. Because it permits specific inferences on the relation between education and inequality of results, this theory shall be relied on heavily, particularly in the latter part of the paper. However, I will argue that this theory is most properly seen as providing one of two polar models of the mechanism of the attainment process. The contrasting model, to be formulated in the sequel, has very different implications for the role of education for inequality of results. This model is in many ways similar to the one proposed recently by Thurow (1975).

The problem of this paper is only a meaningful one if it is established that education is important for individual attainments of social and economic status. If education is argued to be unimportant for individual attainment, then it would not be necessary to discuss whether or not the observed association implies that educational attainments are important for the distribution of social and economic attainments. Jencks et al. (1972), in fact, argue that education is unimportant for inequality because the association between education and individual attainment, particularly income attainment, is low as measured by the amount of variance in income explained by education. However, this argument makes a substantive conclusion from what could be, and probably is, a result that is heavily influenced by measurement error, omitted variables, and misspecification of the models. Recent research, also on income attainment (Mincer, 1975), has confirmed the prevailing

belief that education indeed is important for individual attainment, and probably is the most important single individual attribute for attainment.

It is conceivable that education could influence inequality through means other than the attainment process. If the level of education influences economic growth, and if economic growth changes the structure of inequality, one such indirect influence of education on inequality has been established. These indirect effects of education on inequality will not be discussed here.

2. THE ATTAINMENT PROCESS: BASIC CONCEPTS

The dependent variable in the research to be discussed, that is, attainment, is usually measured by sociologists as either socioeconomic status or occupational prestige. Both variables are attributes of a person's occupation. The two measures are closely interrelated.[1] The most commonly used measure of socioeconomic status--Duncan's SEI scores (Duncan, 1961)--in fact, is derived from occupational prestige scores. There has been some dispute over what the measure taps. Goldthorpe and Hope (1972) argue forcefully that occupational prestige scores do not refer to deference, that is a relational concept, but should be seen as a measure that reflects the "goodness" of occupations according to both economic and noneconomic benefits derived from them.

The major alternative measure of attainment is income. Usually only earnings from jobs are considered in research on individual attainments. The study of wealth attainment has not been a concern in attainment research, since the attainment of income derived from wealth is difficult to study in the sample surveys typically employed.

The choice of a measure of attainment has important implications. Earnings are generated from a specific job-person combination, while socioeconomic status refers to a category of jobs, i.e., an occupation. I will argue in the sequel for a conception of the attainment process that focuses on the matching of persons with various characteristics (one of these characteristics is education) to jobs. Jobs provide incumbents with certain rewards. Earnings are the most important and the most easily measured reward, but other benefits such as interesting work, esteem, etc., are also relevant. Socioeconomic status may indeed capture some of the nonmonetary benefits derived from jobs, but rewards are measured at the level of occupations, not of jobs.

For the purposes of theory construction, it seems most fruitful to focus on the matching of persons to jobs and not to the broader category of occupations. Since no measure of nonmonetary benefits of jobs is available, the distribution of earnings will be the major concern here. An additional reason derives from the different metric properties of earnings and socioeconomic status. Socioeconomic status is an ordinal variable, though commonly used as an interval level variable. The distribution of attainments according to this variable is therefore not defined. The distribution of earnings is well defined since earnings are measured in monetary units; hypotheses on the impact of education on the structure of inequality in terms of earnings are empirically more meaningful.

The attainment process is an over-time process, as a person's attainments usually vary over the course of their lifetime. Denote a person's level of attainment at time t as $y(t)$, where time may be

measured from birth or from time of entry into the labor force. Denote by x_1, x_2, x_i ... x_n, characteristics of the person that are assumed relevant for the attainment process. In addition to education, the favorite x_i variables in sociological research have been the socioeconomic origin variables measured by parental socioeconomic status, and parental education. These variables serve as indicators of the family background, as well as measures of the point of departure for the individual attainment process (Blau and Duncan, 1967). In addition, the work by Sewell and his associates (e.g., Sewell and Hauser, 1976) has focused attention on social-psychological variables such as aspiration and ability that are shaped by a person's family background. Economists' favorite variables in studying individual attainment have been (in addition to education) ability and post-school training, particularly on-the-job training and job experience.

It is important to note that most of the variables mentioned above measure personal characteristics that are stable over time and formed at entry into the labor force. However, post-school training and experience are variables that are changing over time. The distinction between time constant and time varying variables relevant for attainment is an important one for the argument that follows.

The attainment process translates personal characteristics into observed attainment for a person at some point in time t. Formally,

$$y(t) = F(x_1, x_2 \ldots x_i \ldots x_n; \beta_1, \beta_2 \ldots \beta_n ; t). \qquad (1)$$

There are two tasks for attainment research: (1) to specify the function F that transforms personal characteristics into attainment,

and (2) to estimate the parameters β_1, $\beta_0 \ldots \beta_n$ that measure the influence of the x_i variables on attainment, given F.

It is useful to conceive of the various x_i variables as determining a person's resources for occupational and economic attainment. Let z denote a measure of a person's overall level of resources, where z may be time dependent. The function F is then the function that transforms z into y(t). With this distinction, one may add to the two tasks for attainment research already mentioned, a third task--that of specifying the function G in

$$z = G(x_1, x_2 \ldots x_n ; \alpha_1, \alpha_2 \ldots \alpha_n ; t). \qquad (2)$$

The introduction of the function G is particularly useful for the conceptualization of the impact of education on inequality of opportunity, since inequality of opportunity is usually conceived of as a question of the relative importance of achieved versus ascribed personal characteristics. Since the concern here is with inequality of results, I will not discuss G. The function is usually taken as linear, as is F.

3. INEQUALITY OF RESULTS AND THE ATTAINMENT PROCESS

The problem of the relevance of the attainment process for inequality of results is a problem of whether the attainment process determines the distribution of attainments, particularly the distribution of earnings. In terms of equation (1), the question is whether the function F transforms the distribution of personal resources into a distribution of attainments, so that a change in the distribution of a resource variable (in particular a change in the distribution of education) will change the degree of inequality of results. Alternatively, the function F

might be reflecting a mechanism whereby individuals are allocated to different attainment levels, so that a change in the distribution of resource variables does not lead to a change in inequality. Under this alternative mechanism, the distribution of attainments is taken as exogenous to the attainment process. The distribution is explained by forces other than personal characteristics. No attempt shall be made here to explain how the distribution of attainment is generated when it is exogenous to the attainment process, though it obviously is an important task.

The most straightforward way to research whether one or the other mechanism prevails would seem to be an analysis of the co-variation over time of the distribution of attainments and personal resources (in particular education) in society. This has not been an important research strategy (see, however, Lydall, 1968). The findings of the few studies that exist are furthermore ambiguous, as it does not necessarily follow that an observed co-variation across societies or over time between the distribution of education (and other personal characteristics) and the distribution of attainments reflects a causal relationship. Clearly a third variable, say "economic development," might be responsible for an observed co-variation.

An alternative research strategy would be one that specified the different consequences for the attainment process of the distribution of attainments being determined exogenously or endogenously. The analysis of the prevalence of these consequences could then be carried out in order to determine whether or not the attainment process creates the structure of inequality. The first steps in this direction will be attempted in this paper; that is, I will outline two alternative conceptions of the attainment process. One conception is consistent with the notion that the distribution of attainments is determined by

the distribution of personal resources as a result of the attainment process. The other conception is consistent with the notion that the distribution of attainments is exogenously determined, and that the attainment process is an allocation process. In later sections of the paper, I will briefly review some research findings in the area emphasizing their bearing on the choice between the two theories.

A theory of the attainment process consistent with the notion of the distribution of attainments being endogenously determined would be one that predicts a one-to-one relationship at the individual level between a person's level of resources and his or her level of attainment. Otherwise, it is not conceivable that a change in the distribution of resources would lead to a change in the distribution of attainments.

However, a close relation between resources and attainments at the individual level only establishes a necessary, but not a sufficient condition for the distribution of attainments to be endogenously determined. It is conceivable and likely that an allocation process in a predetermined structure of inequality will also result in a close relationship between resources and attainments. It is of course the case that if resources have no relationship to attainments, then the distribution of attainments is exogenously determined. This latter possibility is, however, purely hypothetical, since the allocation of persons to different levels of attainments in general will be influenced by characteristics of persons.[2]

While the cross-sectional association between resources and attainments provides no information on the nature of the attainment process, a focus on what produces change in attainments at the individual level makes it possible to go further toward identifying whether the

distribution of attainments is endogenously determined.

If the distribution of attainments is endogenously determined, then change over time in an individual's level of resources should typically lead to changes in his/her level of attainments.[3] Conversely, if changes in attainments typically take place without preceding changes in resources, then this provides evidence that the distribution of attainments does not directly reflect the distribution of resources as transformed by the attainment process. Similarly, changes in resources that do not lead to a change in attainment provide evidence that the structure of inequality is exogenously determined.

If the distribution of attainments is endogenous, changes in attainments at the individual level should then be preceded by changes in resources. Using the notation introduced earlier, the simplest such mechanism for change would be

$$\frac{dy(t)}{dt} = a \frac{dz(t)}{dt}, \tag{3}$$

where $z(t)$ is the measure of resources, explicitly assumed to be time dependent.[4] The solution to this equation, providing a first step toward the specification of F from equation (1), is

$$y(t) = k + az(t), \tag{4}$$

where k is the minimum level of attainment in society, and a is a coefficient that converts resources into attainments. Equation (4) establishes a direct linear relationship between resources and attainments. Whether the career itself will be linear in time depends on the specification of $z(t)$.

For the specification of the change mechanism of the attainment process in the situation where the distribution of attainments is exogenously determined, it is useful to emphasize an explicit distinction between persons and jobs occupied by persons. The reason is that in this case the distribution of attainments is unaffected by changes in the distribution of personal characteristics. The attainment level associated with a given level of resources would presumably be different after a change in the distribution of resources. In such a system, attainment levels are characteristic of jobs, not of persons, even though the observed association between attainments and resources could be high.

With attainment levels associated with jobs, changes in attainments can only take place through changes in jobs. In a tight system, where most jobs are filled, this means that only when some other job-holder vacates his or her job or a new job is created will a change in attainments take place. A person will leave a job because (s)he retires, is fired, or moves to a better job. There is no necessary connection between the creation of a vacancy in this way and whatever changes take place in persons' resources for social and economic attainment. The major source of change in a system with an exogenously determined structure of inequality would be mobility of persons along vacancy chains created by new jobs and the retirement of persons from the system.[5]

Assuming that a person's resources are relevant for getting access to jobs, it follows that changes in attainments are a function of the availability of vacant jobs and a person's resources. Available

vacant jobs result in job shifts that increase a person's attainment level; the rate of change in attainment should be related to the rate at which job shifts occur. If the quantity $v(t)$ measures the number of shifts a person has undertaken by time t, then,

$$\frac{dy(t)}{dt} = w(z) \frac{dv(t)}{dt} \tag{5}$$

would describe how change in attainment is brought about. The solution to this equation would be of the form,

$$y(t) = y(0) + w(z)\, v(t), \tag{6}$$

where $y(0)$ is the level of attainment at entry into the labor market and $w(z)$ is a coefficient that gives the average gain per job shift (presumably related to a person's level of resources). The expression is parallel to (4) except that the rate of job shifts cannot explain the attainment of the first job, i.e., $y(0)$. The crucial difference between the two models is that in (4) resource changes govern the career, while in (6) job changes govern the career; these job changes are generated by the creation of vacancies in the system, not by the changing resources of persons.

This section has only identified what the attainment process should look like under the two assumptions about the distribution of attainments. The crucial problem of identifying the circumstances that lead to the emergence of one or the other attainment process will be discussed in the next section.

4. THEORIES OF THE ATTAINMENT PROCESS

The previous section identified the need for two theories of the attainment process. One theory should predict that changes in attainment are produced by changes in personal resources. The other should predict that changes in attainment are produced by the creation of vacant jobs that induce mobility in a predetermined structure of inequality. These two theories will not necessarily describe mutually exclusive processes. Empirical attainment processes may contain elements of both, and, more importantly, different segments of the labor market may be dominated by one or the other process.

A powerful theory that predicts that changes in attainments are produced by changes in personal resources is available in the form of neoclassical economic theory applied to earnings determination. This theory will be described first. It relies on a very strong assumption regarding the nature of the labor market. I will subsequently show that failure of this assumption to be met coincides with the emergence of the second form of the attainment process where changes in attainments are created by the utilization of mobility opportunities.

The Neoclassical Theory

In this conception of the attainment process, earnings are obtained in a perfectly competitive labor market assumed to be like a market for other commodities. In such a market, prices (which are wage rates) clear the market in the short run, and changes in demand and supply change wage rates in the long run. In classical economics, labor is assumed to be a homogenous commodity. Variation in wage rates reflects variations in the supply of labor to different jobs caused by

the different attractiveness of jobs, so that the most unpleasant jobs carry the highest wages. This clearly is not an adequate explanation for observed earnings differentials, where it tends to be the more attractive jobs that carry the highest wages. Neoclassical economics in the form of Human Capital theory remedies this situation by introducing productivity of workers as a source of variation in wage rates. Productivity in turn is determined by variables that here have been lumped together under the label of "personal resources."

The relation between productivity and earnings is established by the principle of marginal productivity. A profit maximizing firm will be in equilibrium when marginal products equal wages in each time period.[6] Each worker then has unique marginal products determined by his/her skills and efforts. Skills are acquired by persons through training and schooling at a cost. The cost of training is partly direct cost in the form of tuition, partly, and more importantly, earnings foregone in the training period. No one should undertake training that does not produce a future earnings stream sufficiently high to recover the costs of training.[7] Wage rates will reflect training costs for skills, and the distribution of earnings will reflect the distribution of Human Capital. In addition, some variation will be caused by ability. Ability is a somewhat nebulous concept in Human Capital theory; it presumably covers not only ability as measured by I.Q., but also other productivity relevant personality traits as determined by a person's family background in the manner suggested by sociological research.

The neoclassical theory establishes a direct correspondence between personal resources and earnings attainment. The correspondence

is created in a competitive market where the object of bargaining is wages. For this reason, I will refer to this mode of transforming personal characteristics into attainments as wage competition in the sequel, following Thurow (1975).

The relationship between education and attainments in wage competition is assumed to reflect that education produces marketable skills. The distribution of earnings attainments reflects the distribution of skills, and it therefore follows that a change in the distribution of education would result in a change in the distribution of earnings. Specifically, if the supply of persons with higher education increases, the earnings of highly educated persons would go down, and the earnings of persons with lower education would increase, reflecting the reduced supply of such persons. Education can be used to reduce inequality in society, if reality conforms to the assumptions made in the wage-competition model. Also it follows from the theory that the major constraint on a person's earnings capacity is their inability to acquire skills. Therefore, policies to reduce poverty should be directed at training low-income groups.

It was argued in the preceding section that the proper way to evaluate a theory of the attainment process which conforms to the theory just described would be to test whether or not changes in attainments are produced by changes in personal resources. The associations between education and attainments do not provide information that will enable an evaluation of the theory and of the change in attainments after entry into the labor force. The Human Capital theory predicts that the earnings-by-age profiles would be flat if no training took place after entry into the labor force (Mincer, 1958). However,

it is argued that such training does take place (Becker, 1964), primarily as a result of training on the job.

Training after entry into the labor force is not evenly distributed over the life-span. Rather, training tends to be concentrated in the earlier periods of employment where there is more time left to recuperate the costs of training, and then gradually taper off. Since earnings directly reflect training, age-earnings profiles will similarly increase rapidly in the beginning and then gradually taper off until a stable level of earnings is obtained; such attainment profiles are indeed observed (see Sørensen, 1975, for an example). However, the attainment-by-age relationship does not constitute direct evidence for the wage-competition model unless skills acquired through training after entry into the labor force are directly measured. This point will be demonstrated after the description of an alternative theory of the attainment process in the sequel.

Amount of training is not only assumed dependent on time left in the labor force, but also on the ability of the person, since more able persons should learn at a faster rate and hence at lower costs. One possible specification of the change in resources that produces the changes in productivity and earnings predicted from the neoclassical theory would be

$$\frac{dz(t)}{dt} = s + cz(t) \qquad c < 0, \qquad (7)$$

where s is a person's ability, and c is a coefficient that reflects the cost of training. This model predicts resources to increase rapidly in the beginning and gradually taper off as c is negative

so that when more skills already have been acquired, less growth in skills will occur. The solution to (7) is

$$z(t) = z(0)e^{ct} + \frac{s}{c}(e^{ct} - 1), \qquad (8)$$

where $z(0)$ is the resources at entry into the labor force produced primarily by schooling. Inserting (8) into equation (4) will give the necessary specification of the attainment process, since all changes in attainments are produced by change in $z(t)$. Attainments will then be predicted to exhibit an age profile concave to the age axis (or more correctly time in the labor force), conforming to what is empirically observed.

The neoclassical theory is a powerful theory. However, it relies on a very strong assumption concerning the nature of labor markets and the employment relationship. This assumption is not necessarily met in all segments of the labor market, as I will discuss next.

The Attainment Process and the Employment Relationship

The wage-competition model of earnings determination has been frequently criticized. Particularly prominent in recent years have been alternative approaches to the analysis of labor markets, identified as dual labor market theory (e.g., Doeringer and Piore, 1971) and the so-called radical theory (Gordon, 1972). These criticisms often consist in the identification of observed features of labor markets that run counter to the assumptions of the wage-competition model (barriers to competition, lack of information, unionization, and other imperfections in the labor market). Many of these empirical features can, however, be accommodated by the neoclassical theory (see Cain, 1975, for a review of the various issues). An alternative theory that is equally

as powerful as the neoclassical theory is more likely to emerge from a revision of the fundamental assumption of the wage-competition model.

Of the various assumptions made in deriving the wage-competition theory (purposive behavior, certainty, competitive and perfectly functioning labor markets), the most crucial appears to be the assumption concerning the nature of the labor market as a market with properties like those of markets for goods. This implies that labor shares essential characteristics with ordinary commodities. Especially crucial seem to be the following characteristics: (1) goods are divisible, so that any quantity may be supplied and demanded; (2) in a market for consumer goods, the seller relinquishes his/her control over the use of the good to the buyer, who can dispose of the good as he or she pleases; (3) in a market for goods, a certain quantity of goods with well-defined properties is supplied so that comparisons of properties of goods and prices can be carried out in each time period.

It is essential that labor share these characteristics of goods because otherwise the marginal productivity principle for the determination of wages cannot apply. The marginal productivity principle means that the quantity of labor in each period can be adjusted to the wage rate. This implies (1) that labor is divisible, (2) that variations in output can be attributed to the performance of a single employee, and (3) that variations in performance can effectively be tied to wage rates. The latter condition is fulfilled if employers have complete control over the job so that at any point in time they will replace a current employee with another employee willing to produce more at the same wage rate as the incumbent, or willing to work at a lower wage rate.

These three conditions for the marginal productivity theory to apply may or may not be fulfilled. They are not fulfilled where

(1) labor is not a divisible commodity--because production systems are interdependent so that single jobs cannot be added or eliminated; (2) variations in output cannot be attributed to variations in performance of single employees--because the contribution of a single employee cannot be identified in interdependent systems of production, or the output is inherently difficult or impossible to measure (as are administrative services, client relationships, teaching effectiveness, etc.); (3) employees have bargaining power over the employer that reduces the employer's control over the job. Particularly the third condition will be emphasized here. Employees should use their bargaining power to gain control over the decision to leave their job so that workers only leave jobs when a better job is available. If employers do not have control over this decision, they cannot overcome the problem of attributing variation in output to variations in performance of single employees by experimentation with different persons in the same job. Most importantly, employers cannot--when employees have control over the decision to leave--replace the current employee with another of higher productivity even if such a job candidate was available; hence, the employment relationship will be insulated from competition.

The bargaining power of employees used to gain control over the decision to leave may be derived from several sources. The most important sources appear to be the following.

(1) Training requirements of jobs. To the extent that specific skills needed on jobs can only be acquired on jobs, employees gain control over the job for two reasons. The first is that training for specific skills cannot be used elsewhere (Becker, 1964). Outsiders cannot

replace incumbents without incurring new training costs. Second, training on the job is predominantly provided by co-workers. Co-workers cannot be expected to provide effective training if they are subject to competition from trainees once the training period is over. Hence, employers are forced to relinquish control. This latter argument has especially been emphasized by Thurow (1975), while the skill specificity argument is emphasized in the dual labor market theory (Doeringer and Piore, 1971).

(2) Autonomy on the job. The more complex and specialized the tasks of the job, the more costly it will be for employers to control and supervise job activities. The resultant autonomy gained by the employee on the job should also increase his/her bargaining power relative to the employer and hence control over the decision to leave the job.

(3) Organization of jobs. When employees have control over jobs and insulation from competition, employers are faced with the problem of how to ensure that the highest possible effort is displayed by employees. The institution of promotion ladders in job hierarchies can partly be seen as a way of motivating employees through competition for promotion opportunities. Such promotion schedules will only have the intended effect if promotion opportunities are available to all. This means that new recruits should only be allowed to enter at the bottom of the hierarchy. Such a system further reinforces employee control over the job. Another aspect of job organization, interdependence among jobs created by the production system, has already been identified as a source of insulation from outside competition since the performances of single employees are difficult to identify.

(4) Collective action. Finally, employees can gain bargaining power through collective action, particularly unions. Though the emergence of unions may be partly determined by the same technological and organizational characteristics of jobs that give individual employees control over the job, the emergence of such collective action may of course also take place in situations where these technological and organizational characteristics are absent and where the gains of collective actions are greatest.

This brief outline of the sources of employee control over the job indicates the sources for the emergence of an alternative to the wage-competition model for the attainment process. This model will be identified as vacancy competition as persons can only get access to jobs when they are vacant in the situation where employees have control over the decision to leave jobs. The properties of this model for the matching of persons to jobs and its consequences for the relation between personal resources and attainments are described next.

Vacancy Competiton

When employees have control over decisions to leave jobs, no one can get access to a job unless the incumbent leaves on his/her own decision or a new job is created. Competition among job seekers will be a competition for vacancies and not focused on wage rates as in the neoclassical model. Since job incumbents are isolated from competition from the outside, employers have no effective way of enforcing a translation of productivity differences into variations in wage rates. Wages will tend to become stable and heavily influenced by institutional forces (such as collective bargaining),

the desire of employees to preserve relative wage differentials, and the use of wage differentials as motivational devices. Attainments become a characteristic of jobs, as similar jobs will tend to provide similar earnings regardless of the specific characteristics of job incumbents. This is the exact opposite of the outcome of wage competition, where similar personal characteristics will provide similar earnings because earnings differences reflect productivity differences regardless of the job occupied.

In wage competition, employers can be indifferent to the characteristics of employees since wage rates will reflect productivity differences produced by a person's resources. In vacancy competition, employers do not have wage rates as a guide to productivity. Further, they have no effective control over the length of the employment relationship. As a consequence, employers should be greatly concerned with indicators of future productivity of potential employees, including indicators of the trainability of potential employees. Educational attainment and background characteristics of job candidates will serve as indicators of future productivity. Thurow (1975) suggests conceiving of these characteristics as criteria for the ranking of persons in a labor queue. The attainment process then may be conceived of as a matching of the labor queue to the job queue, so that the highest ranked persons in the labor queue will obtain the best jobs in the job queue.

The criteria that serve to rank persons in the labor queue are not measures of a person's actual productive skills, but rather indicators of the person's ability to acquire productive skills in the job and exhibit high productivity in the future. It follows that it is the screening function of the educational system that will account for the

importance of education in the attainment process. Changes in the distribution of education will not change the distribution of attainments, but may change the importance of specific educational achievements for attainment. If, for example, high school diplomas are nearly universal, attainment of this level of education will not be of major importance for the social and economic attainment a person achieves.

In vacancy competition, changes in the distribution of education will change the typical attainment level associated with a particular level of education, but may not change relative attainment differences. If the proportion of persons with college degrees increases, high school graduates will be pushed further down the labor queue as jobs previously available to them will be filled with college graduates.[8] In wage competition, in contrast, such a change in the distribution of education would change the attainment differentials between college and high school graduates, but not necessarily the job opportunities.

As in the discussion of the wage-competition model, it is possible to specify the functional form of the model for the attainment process, if vacancy competition applies--that is, further specify equation (6). Vacancy competition means that changes in attainment will be dependent on the resources that determine a person's ability to get access to vacant jobs, and on the distribution of vacant jobs. It is reasonable to assume that for a given level of resources (education and background characteristics), the higher the level of attainment already obtained, the less likely it is that a person will get access to an even better job.[9] A model that expresses such a mechanism is

$$\frac{dy(t)}{dt} = z + by(t), \qquad b < 0. \tag{9}$$

The coefficient b is assumed to be negative, so that the higher the level of attainment already obtained, the less growth in attainment will take place. The larger the absolute magnitude of b, the more strongly change in attainment is constrained by the level of attainment; b reflects the availability of vacant jobs or the opportunity structure of society.

It is easy to show that (9) in fact is a specification of equation (6), where rate of job shifts governs the attainment process. The solution to (9) is

$$y(t) = \frac{z}{b}(e^{bt} - 1) + y(0)e^{bt}, \tag{10}$$

where z, the level of resources, is assumed constant over time. Equation (10) will give a career curve very similar to the one predicted from equation (8), though as an outcome of a very different mechanism of change. If in (9) t goes to infinity, $y(t)$ will approach a value $y(e) = -\frac{z}{b}$. With this definition, it is possible to rewrite (1) as (see Sørensen, 1975, for details)

$$y(t) = y(0) + v(t)[-b(y(e) - y(0))], \tag{11}$$

where $v(t) = \frac{1}{b}(e^{bt} - 1)$. It may be conceived of as a measure of the number of job shifts having occurred by time t. Equation (10) is linear in $v(t)$ with a slope equal to $-b[y(e) - y(0)]$. The quantity $[y(e) - y(0)]$ is the total gain in attainment to be made in a person's career as determined by his/her resources. The total number

of job shifts will be obtained by letting $t \to \infty$ in the expression for $v(t)$, and will equal $-\frac{1}{b}$. Hence $-b[y(e) - y(0)]$ is the average gain per job shifts as demanded by equation (6).

It can be shown that the parameter b reflects the rate at which vacancies are created in society and the distribution of attainment levels in society (Sørensen, 1976). More specifically, the higher the rate at which vacancies are created and the more evenly jobs are distributed according to attainment levels, the smaller b will become in absolute magnitude.

The vacancy-competition model then predicts a career curve very similar to the one predicted by the neoclassical wage-competition model. The two mechanisms for change in attainments are, however, very different, and the two models have very different implications for the importance of education for the structure of inequality. The two models may co-exist in society, as some segments of the labor market may conform to the wage-competition model, while other sectors conform to the vacancy-competition model. It is obviously of great importance to establish which model is the dominant one. A brief review of some of the available evidence on this question is given next.

5. RESEARCH EVIDENCE ON THE NATURE OF THE ATTAINMENT PROCESS

The observed association between a person's education and his/her attainment does not indicate whether the dominant mode of matching persons to jobs follows the wage-competition or the vacancy-competition model, and whether or not education can be used to change inequality of results. The specification of the two theories of the attainment process just completed only reaffirms this point. In both wage

competition and vacancy competition, education is predicted to have a strong relationship to attainment---in the former case because the educational process creates marketable skills, and in the latter case because education serves as a major criterion for a person's position in the labor queue.

It might be argued that the analysis of the relationships between family background characteristics and attainment that has been such a concern in sociology would have some bearing on the question. In the vacancy-competition model, these background characteristics may serve as indicators of future productivity; hence, as criteria for ranking in the labor queue. In the wage-competition model, attainments reflect productivity; hence, background characteristics should be irrelevant. The problem is that these background characteristics in the wage-competition model may serve as indirect measures of a person's ability, and so be relevant for a person's productivity. Ability presumably is both directly relevant for productivity and indirectly relevant as more able persons may acquire more training, other things equal (cf., equation 7 above). The observed association between background characteristics can be interpreted as conforming to either model.

Since the observed association between education and attainment does not provide a guide to choosing between the two models, I have argued that a direct study of change in attainment over time is needed. Such analysis will, however, only resolve the issue if direct measures are available of skills and other productivity-relevant characteristics acquired after entry in the labor force. Using earnings as a measure of productivity as is sometimes done, clearly confounds the issue.

Time in the labor force as a proxy for skills acquired is commonly used. Mincer (1975) thus uses time for this purpose in the wage-competition framework. However, time will serve as a proxy for either number of job shifts or for training and experience. Further, the mechanism by which time will relate to attainments produces identical outcomes in the two models (cf., equations 8 and 10) under a reasonable specification of the two mechanisms. These outcomes, which are predicted age-attainment profiles, conform to what is empirically observed, but do not discriminate between the two models. Direct measures of resources acquired after entry into the labor force that are not derived from time measures seem never to have been obtained, and appear difficult to obtain. Direct measures of job shifts are more easily obtained. However, in order to make firm inferences on the nature of the attainment process, it is necessary to show that observed job shifts are not created by changes in resources, but reflect the operation of a mobility regime created by the movement of persons in response to the creation of vacancies. Work in the direction of specifying such mobility regimes has only recently been attempted.[10]

A third method of establishing the importance of education for the distribution of attainments would be to directly study at the societal level the co-variation between the distribution of education and the distribution of attainments, in particular the distribution of income. This would circumvent the problem of identifying the mechanisms of the attainment process from individual levels of analysis. On the other hand, it might, as already argued, be difficult to draw firm inferences about the causality of the relationship. It should be mentioned, though,

that the relationship between the income and education distributions in the period since World War II can be taken as evidence that vacancy competition is the dominant model of attainment (Thurow and Lucas, 1972). Despite a marked change in the distribution of education, there has been no change in the distribution of incomes contrary to what would be predicted from the wage-competition model.

Possibly the most fruitful way to research the problem of this paper would be to draw contrasting implications from the two models and then test these implications in order to provide indirect evidence on the prevalence of one or the other model. Some examples of this kind of analysis can be given using recent research results on the attainment process.

It follows from the specification of the vacancy competition model in equation (10) that the observed effect of resources on attainment will depend on the magnitude of b, that is, the opportunity structure in society. If z, the measure of resources, is specified as a linear function of measured variables (education, parental status and education, etc.), then the observed coefficients, d_i, to these variables with level of attainment as the dependent variable would be (inserting $z = a_0 + \sum_i a_i x_i$ into equation 10)

$$d_i = \frac{a_i}{b}(e^{bt} - 1) \qquad (12)$$

as $t \to \infty$, d_i will approach $-\frac{a_i}{b}$. Observed effects will be larger the older the respondents and the smaller b is in absolute magnitude. The smaller b is in absolute magnitude, the more favorable the opportunity structure.

In a recently completed replication of the Blau and Duncan study (1967), Featherman and Hauser (1976) have shown that the observed association between personal characteristics and socioeconomic attainment is higher for blacks today than in the earlier study, and is approaching the association observed for whites. This is in accordance with the results predicted here if the opportunity structure for blacks is interpreted to have become more favorable.[11]

There are other implications of the vacancy-competition model for which there seems to be some support. Thus one would predict that if some levels of education are almost uniformly distributed, they should not have an important effect on rankings in the labor queue. Recent research (Olneck, 1976, and unpublished results by Featherman and Hauser) has shown that below the college level, years of schooling have less of an impact on attainment. This result is inconsistent with the wage-competition model, since a year of schooling from this model should be expected to produce approximately the same attainment difference regardless of whether the year of schooling is below the college level or not.

Boudon (1974) has formulated a model of the attainment process with properties similar to the vacancy-competition model. Using this model, Boudon argues that the demand for higher education is self-stimulating, since growth in educational attainments means that even more education is needed to obtain a given level of social and economic attainment. Future trends in educational enrollments would, for this reason, indirectly provide a test of the prevalence of the vacancy-competition model. The period of the sixties clearly witnessed a growth in education consistent with this implication of the vacancy-competition model (see also

Featherman and Hauser, 1976). The experiences of the seventies provide somewhat ambiguous evidence, however (Freeman, 1976; Suter, 1976).

6. CONCLUSION

This paper has specified the properties of the process of social and economic attainment in the situation where the structure of inequality is endogenously determined, i.e., where the distribution of attainments is determined by the process of attainments; the paper has also specified properties of the attainment process if the structure of inequality is exogenous to the attainment process, i.e., if the attainment process is an allocation process. In the former case, it was argued that growth in attainments over an individual's lifetime should be produced by growth in personal resources. The neoclassical theory of earnings determination was shown to provide a substantive rationale for the emergence of this attainment process. In the latter case, growth in attainments is created by the utilization of mobility opportunities in society, so that the rate of job shifts, not changes in resources, is the major source of change in attainments. The vacancy-competition model for matching persons to jobs gave the substantive rationale for the emergence of an attainment process with these properties.

Whether the dominant mode of matching persons to jobs follows the wage-competition or the vacancy-competition model, a close cross-sectional association between personal characteristics (in particular education) and attainment is predicted. Hence, the observed association between personal characteristics and attainment provides no information on what is the dominant attainment process. Direct analysis of change over time

in an individual's attainment would provide the needed information to discriminate between the two models. However, it is necessary to directly measure changes in resources over time (i.e., on-the-job training and the like) and the rate of job shifts to make this inference. These measures are not available in present research; commonly, time in the labor force or age is used as a proxy measure. It has been shown here that the time path of the attainment process will be very similar for the two models under reasonable specification of the two mechanisms for change. While this makes both models adequate to account for observed attainment-by-age-profiles, the use of time makes it impossible to differentiate the two models.

The most fruitful direction for research at the present time may be one where different substantive implications of the two models are specified and tested. Some examples of this approach were given in the last part of the paper. Since the two models are of how labor markets operate, it would seem that future research should be directed at studying labor markets and their impact on the attainment process.

NOTES

[1]For a discussion and analysis of measures of occupational prestige and socioeconomic status, see Featherman, Jones, and Hauser (1975).

[2]The assumption that individual characteristics are irrelevant for attainment is nevertheless often made in the development of mathematical models of mobility, particularly stochastic models. For a review, see Sørensen (1975).

[3]Resources that change over time will typically not include educational attainment obtained in schools, since the time period of interest here is the period after entry into the labor force. Resources that change after entry into the labor force are typically skills acquired in post-school training. However, if it can be shown that change in resources will have an impact on changes in attainments, it follows that changes in the distribution of schooling will affect the distribution of attainments.

[4]It may be argued to be more appropriate to link changes in resources to relative change in attainments. The dependent variable should then be by log $y(t)$ rather than $y(t)$. The distinction is unimportant here and the slight complication shall be avoided.

[5]The notion of vacancy chains was introduced by White (1970) to mirror structurally induced mobility. If person A moves from job x to job y and person B in job z moves to job x (previously occupied by A), and a third person (in job w) moves to job z, a vacancy chain has been created with a direction opposite the movement of persons.

[6]Marginal product will not equal wages when there is specific on-the-job training in the firm (Becker 1964). Although this is recognized in Human Capital theory it presents a difficult problem in the theory, and specific on-the-job training may alternatively be seen as one of the sources of the emergence of the alternative model of the attainment process to be discussed.

[7]Of course some persons may have such a strong preference for schooling that they are willing to undertake training that does not produce a sufficiently high future earnings stream to recover costs. It is assumed here as in the basic theory that such behavior is relatively infrequent.

[8]For a more extended analysis of the effects of a change in the distribution of education, see Thurow (1975).

[9]A formal derivation of this proposition assuming an unequal distribution of attainments is given in Sørensen (1976).

[10]The introduction of the notion of vacancy chains by White (1970) was an important step in the direction of specifying structurally induced mobility regimes. However, White (1970) assumes that individuals are homogeneous in deriving the model. For an attempt at modeling the interplay between individual characteristics and structurally induced mobility, see Sørensen (1976).

[11]It follows also from equation (12) that if the observed gross association between ascriptive characteristics and attainments is used as a measure of inequality of opportunity, then the more opportunities for growth in attainments there are in society the higher this association. The opportunities for growth can be shown to reflect the rate at which new vacancies are created in the system and the overall distribution of jobs according to attainment levels (Sørensen, 1976). The latter determinant of the opportunity structure indicates one way in which the structure of inequality influences equality of opportunity.

REFERENCES

Becker, Gary S. 1964. Human capital. New York: National Bureau of Economic Research.

Blau, Peter M., and Duncan, Otis Dudley. 1967. The American occupational structure. New York: John Wiley and Sons.

Boudon, Raymond. 1974. Education, opportunity and social inequality. New York: John Wiley and Sons.

Bowles, S., and Gintis, H. 1976. Schooling in capitalist America. New York: Basic Books.

Cain, Glen G. 1975. The challenge of dual and radical theories of the labor market to orthodox theory. Madison, Wisconsin: Institute for Research on Poverty, Discussion Paper 255-75, University of Wisconsin.

Doeringer, Peter B., and Piore, Michael J. 1971. Internal labor markets and manpower analysis. Lexington: Heath Lexington Books.

Duncan, Otis Dudley. 1961. A socioeconomic index for all occupations. In A. J. Reiss (ed.), Occupations and social status. New York: Free Press.

Featherman, David L.; Jones, F. L.; and Hauser, Robert M. 1975. Assumptions of social mobility research in the U. S.: the case of occupational status. Social Science Research 4:329-360.

Featherman, David L., and Hauser, Robert M. 1976. Changes in the socio-economic stratification of the races, 1962-1973. American Journal of Sociology 82:621-651.

Freeman, R. 1976. The overeducated American. New York: Academic Press.

Goldthorpe, J. H., and Hope, K. 1972. Occupational grading and occupational prestige. In K. Hope (ed.), The analysis of social mobility: methods and approaches. Oxford: Clarendon Press.

Gordon, D. M. 1972. Theories of poverty and underemployment. Lexington, Massachusetts: Lexington Books, D. C. Heath and Company.

Jencks, Christoffer, et al. 1972. Inequality: a reassessment of the effect of family and schooling in America. New York: Basic Books.

Lydall, H. F. 1967. The structure of earnings. Oxford: Oxford University Press.

Mincer, Jacob. 1958. Investment in Human Capital and the personal income distribution. Journal of Political Economy 66:281-302.

_____1974. Schooling, experience and earnings. New York: National Bureau of Economic Research.

Olneck, Michael. 1976. The effect of education on occupational status and earnings. Madison, Wisconsin: Institute for Research on Poverty, Discussion Paper 358-76, University of Wisconsin.

Sewell, William H., and Hauser, Robert M. 1976. Recent developments in the Wisconsin study of social and psychological factors in socioeconomic achievement. Madison, Wisconsin: Center for Demography and Ecology, Working Paper 76-11, University of Wisconsin.

Sørensen, Aage B. 1975. The structure of intragenerational mobility. American Sociological Review 40:456-71.

_____1976. The structure of inequality and the process of attainment. Madison, Wisconsin: Institute for Research on Poverty, Discussion Paper 364-76, University of Wisconsin.

Suter, L. E. 1976. Enrollment in the post-Vietnam era. Paper presented at the American Sociological Association Meetings, New York City, August.

Thurow, Lester C. 1975. Generating inequality. New York: Basic Books.

Thurow, Lester C., and Lucas, Robert E. B. 1972. The American distribution of income. Washington, D. C.: U. S. Government Printing Office.

White, Harrison C. 1970. System models of mobility in organizations. Cambridge, Massachusetts: Harvard University Press.