

Credentials, Signals, and Screens: Explaining the Relationship Between Schooling and Job Assignment

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The empirical relationship between educational attainment and credentials with socioeconomic attainment is well established, but why this relationship arises remains in doubt. The author of this article discusses seven types of middle-range theories meant to explain the relationship: human capital, screening (including filtering), signaling, control, cultural capital, institutional, and credentialist theories. In each, the central causal mechanism concerns how employers and job seekers acquire and use labor market information. The author argues that occupational status attainment and wage determination models are not adequate to explain the mechanisms underlying the process whereby the highly schooled become the highly placed in job hierarchies. He indicates the implications of transformations of the American labor market for further assessment of the relationship between educational credentials and job assignment.

KEYWORDS: educational screening, employers, job matching, labor markets, socioeconomic attainment.

In his magisterial 1927 volume *Social and Cultural Mobility*, Pitirim Sorokin made the following assertion:

In present Western societies, the schools represent one of the most important channels of vertical circulation. This is manifested in hundreds of forms. . . . Many fields of social activity (especially professions) are practically closed to a man who does not have a corresponding diploma; a graduate is often paid better than a non-graduate at the same position. (1927/1959, pp. 170–171)

Sorokin based this claim on little evidence that would carry much weight by contemporary standards—no Mincerian semi-log wage models, no sophisticated parameterizations of father–son mobility tables, and no nationally representative and appropriately weighted datasets. He drew on scattered and unsystematic (if encyclopedic) evidence to establish what may be the firmest empirical finding in the sociology of education: Formal schooling is strongly related to socioeconomic attainment. At least on the individual level, schooling is a good investment. Exactly why this is the case—why attending and graduating from an educational institution is rewarded in the labor market—is less clear.¹

My goal here is to assess what we know and what we still need to discover about the empirical relationship between educational attainment and socioeconomic

success. There is an immense literature that is pertinent to this, so my focus will necessarily be narrow. For the most part, I am concerned with educational credentials acquired before one places oneself in a hiring queue; I pay less attention to the role of credentials acquired after one has joined a particular organization. Most theories of the school–work linkage pertain to the information provided by educational credentials when employers have no opportunity to directly observe job performance (Stigler, 1962; Stiglitz, 1975a). As post-compulsory schooling expands, of course, the effects of these credentials on job assignment will merit a sustained look. I return to this point later in this article.

On the other side of the equation, I take socioeconomic success to mean the acquisition of a job by means of an external hiring decision. Many jobs are obtained through promotions or other internal reassignments. Educational credentials bear a different relationship to promotions than they do to external hires (Bills, 1988c; Spilerman & Lunde, 1991). This is an important issue but is beyond the scope of what I can examine here.

While my conceptual interest is thus in labor market processes that culminate in someone's getting a job (and, simultaneously, in an employer's making a hiring decision), relatively little of the empirical literature is explicitly organized around this conceptualization. Instead, most research on schooling and socio-economic attainment focuses on either occupational status (based in an enormous body of sociological research on status attainment) or earnings (based in labor economics).

Research on status attainment and earnings determination comprises a major share of the literature relevant to my review. Ultimately, however, both attaining an occupational status and securing an income are contingent on a hiring transaction. Thus I recast the dependent variables of occupational status and earnings as being ultimately derived from processes of labor market matching in which employers hire workers and job seekers accept positions. This approach permits me to focus on employer decision making—how employers acquire, evaluate, and act on the information provided by educational credentials—as the basic causal mechanism that underlies middle-range theories of the linkage between schooling and socio-economic outcomes. Occupational status and earnings are useful ways to distinguish better jobs from less desirable ones, but my argument is that the processes that are most at stake in understanding why schooling leads to socioeconomic success have to do with the transactions engaged in by employers and job seekers in connection with specific jobs. Even economic theories of how schooling affects life chances are not necessarily best assessed by means of wage models (Rosenbaum & Binder, 1997). This is particularly true of human capital theory, whose core concept of lifetime earnings probably is better measured with occupational variables than with annual income.

Attending to the employer side of labor markets does not deny the role of other actors in the process of job matching. Job seekers, both employed and not employed, are obviously active participants in the construction of hiring and promotion transactions. As employers seek and evaluate workers, workers also seek and evaluate employers (Logan, 1996). These processes are subject to variable social constraints and pressures. A vast institutional infrastructure constituted (in part) by employment agencies, state regulation, the temporary help industry, and union contracts provides the social setting in which employers must operate. Eventually we need to understand how employers, job seekers, and institutions collectively produce labor market outcomes, but my analysis will focus on employers.

Finally, I concentrate on the relationship between schooling and socioeconomic outcomes in the United States. There is a cost to doing so. In every contemporary society the best jobs are held disproportionately by the most highly schooled, but the cultural and institutional mechanisms by which this comes about vary in ways that make the United States a poor test case of any possible *general* relationship between schooling and life chances (Brown & Sessions, 1999, especially p. 398 and the references cited there; Muller & Shavit, 1998). Kerckhoff (1996, p. 39), among others, argues that the educational system in the United States is unique among those in otherwise comparable societies in virtually every important respect. In particular, American students leave high school with differentiated skills and knowledge but undifferentiated credentials. I ignore cross-societal differences in the school–work relationship but acknowledge that a satisfactory theory of why the highly schooled get the best jobs will need to account for these differences. Indeed, much of the work that originally focused attention on the problematic nature of the relationship between schooling and socioeconomic attainment was based on the experience of both less developed and non-Western nations (Dore, 1976a, 1976b; Hallak & Caillods, 1980; Psacharopoulos, 1979).

An Overview of the Competing Theories

There are many variations on the theme of how schooling is linked to job assignment. These resist neat categorization. One possible grouping pits economic explanations against sociological ones. Despite efforts at finding common ground between economics and sociology (Baron & Hannan, 1994; Swedberg, 1997), the fact remains that there *are* differences in how sociologists and labor economists see the world. Economists are preoccupied with productivity and wages and do not necessarily see these as different things. Sociologists are concerned with occupations, jobs, and the constraints on open labor markets (Granovetter, 1988). Economists emphasize the distinction between social and private rates of return from schooling, a contrast that has rarely caught the attention of sociologists. Rosenbaum and Binder (1997, p. 68) observed simply, “Economists and sociologists offer conflicting views of employers’ needs.”

Different accounts could be categorized by their responses to the admittedly complex question, Do people learn vocationally or occupationally useful things in school, or do schools simply sort people, and what is the basis for any sorting? (see Spring, 1989). Kerckhoff’s (1976) conceptualization of the socialization and allocation roles of schools draws to some degree on this distinction but recognizes that the roles are closely intertwined.

A third classification groups the theories into those that view the more highly schooled as deservedly more successful and those that view the current form of the school–work linkage as unfair and exploitative. This classification highlights the normative nature of much of the literature.

Each of these dichotomies has some merit, but all end by forcing some very different interpretations into the same category. I will follow more of a splitting than a lumping strategy here. I will present seven types of middle-range theories (Merton, 1967) of the relationship between educational credentials and socioeconomic success. These are human capital, screening (including filtering), signaling, control, cultural capital, institutional, and credentialism theories.

The virtue of a middle-range causal theory is that it offers a social mechanism that links individual action with broader empirical social regularities. As argued earlier, the causal mechanism that provides a common thread through these theories has to do with the processes by which employers and job seekers produce labor market transactions. Certainly, this focus is not always clear. The theories overlap, and even their most forceful adherents rarely draw firm lines between them. Classifying any particular theorists into a given category is sometimes a matter of their emphasis and sometimes a matter of which party they see as moving first in the culmination of a job transaction.

Each of these seven types of theories has generated an enormous literature, relatively little of which I can address directly here. Again, my focus is on the reasons for the empirical relationship between educational credentials and job acquisition.

Human Capital Theory: Schooling as Meritocratic Selection

As typically portrayed by sociologists, human capital theories of the role of education are remarkably simple. Schooling provides marketable skills and abilities relevant to job performance. This makes the more highly schooled applicants more valuable to employers, thus raising their incomes and their opportunities for securing jobs (Becker, 1964; Bowman, 1966; Mincer, 1958, 1989; Schultz, 1962). Schooling-acquired skills are typically seen as “general,” that is, transferable across employers, whereas “specific” skills are acquired in the workplace. In this view, employers act rationally by selecting on the basis of educational credentials. Similarly, job seekers (in their prior role as students) act rationally by investing in their own human capital.

Sociologists often caricature human capital theory as “individualist” or “non-structural,” but it is difficult to square these characterizations with any reading of the human capital literature. The principles and assumptions underlying human capital theory are not as simplistic as many sociologists imply, nor were they when Becker and Mincer wrote their original works. Few applications, for example, are now constrained by unrealistic assumptions about perfect competition in the labor market or equal access to labor market information by employers and job seekers. The common sociological practice of simply naming certain variables as “human capital” does not begin to do justice to the theory (Smith, 1990; Sorensen, 1983). At least as theories of earnings, human capital models have evolved enormously since their inception (Akerloff & Yellen, 1986; Card, 1999; Sweetland, 1996).

Nevertheless, after several decades, human capital theory has not produced a persuasive account of why the highly schooled become the highly placed in job hierarchies. The most serious weakness is the theory’s lack of attention to the measurement of its most basic concepts. As Rosenbaum (1986) observed,

It is ironic that human capital theory views the assessment of ability as a trivial problem. It makes ability central to its explanation, but it does not attempt to define or operationalize it, conveniently assuming that managers can easily assess it. The personnel literature on the assessment of managerial and professional ability makes it plain that managers do not know how to measure it, and the statements of managers confirm their confusion on the matter. (p. 164)

These comments could pertain as easily to such concepts as general and specific skills, skill transferability, marginal productivity, or lifetime earnings, all of which are central to the human capital interpretation.

Screening Theory

Theories of educational credentials as screens are well known to sociologists, but the concept of screening (along with the related concept of signaling) plays a larger role in economics. Economic actors are held to send signals and use screens in such activities as insurance or consumer loans as readily as do employers and job seekers.

Stiglitz (1975b) provided an important early statement of screening (see also Chiswick, 1973; Grubb, 1993; Hamilton & Roessner, 1972; Layard & Psacharopoulos, 1974; Liu & Wong, 1982; Miller & Volker, 1984; Psacharopoulos, 1979; Riley, 1976, 1979; Taubman & Wales, 1974; Tucker, 1985; Wiles, 1974; Wolpin, 1977). For Stiglitz, screening is a mechanism by which markets react to imperfect information about the qualities of individuals. As Stiglitz's markets (or employers) screen, his job seekers signal their productive capacities. As he stated, "since individuals are able to capture the returns to general information about their skills themselves, they are willing to spend resources to provide this information—indeed, this is the only way they can fully capture their 'ability rents' " (1975b, p. 287).

Such statements easily lead to the objection that screening theory assumes an unrealistic degree of insightful self-selection, in which individuals are fully aware of their own potential productivity. Certainly, the behavioral assumptions of economists can be frustrating, as screening theory is rarely backed by empirical evidence about how and why people choose to complete or not complete high school or college (Manski, 1993). Indeed, Stiglitz's classic article presents no data, and Spence's claim that "the individual, in acquiring an education, need not think of himself as signaling" (1973, p. 358) provides an unsatisfactory answer to the question of why so many individuals are motivated to acquire further schooling.

In fact, the screening position is more complex than this. Psacharopoulos (1979) identified weak and strong versions of the screening hypothesis (see also Brown & Sessions, 1999). In the strong version, schooling is exclusively a signal, adding no productive capacity to those who acquire it. Employers act irrationally by continuing to pay higher wages to the more highly schooled after observing their job performance directly and failing to correct their mistaken estimates of potential productivity (Barron, Black, & Loewenstein, 1987). The weak version of the screening hypothesis holds that schooling provides a signal but also augments productivity. Employers may pay higher starting wages to the more highly schooled but will make adjustments after watching the worker on the job. As an economist, Psacharopoulos was not concerned with the possibility of any socially damaging efficiency losses by employers engaging in weak screening.

Psacharopoulos proposed comparing returns in competitive and noncompetitive sectors, arguing that screening is more likely in noncompetitive sectors. His analysis of data from the United Kingdom showed little support for the strong version. Subsequent efforts to apply the "P-test" (so named to reflect Psacharopoulos's insightful innovation) have been inconclusive (this research is summarized in Brown & Sessions, 1999), at least partly because of lack of agreement about how to specify the sectors (Arabsheibani & Rees, 1998).

The well-known queuing theory of Thurow (1975) fits rather uneasily between human capital and screening models, but generally proceeds along the lines of the weak version of the screening hypothesis. Thurow argued that even if schools do

not teach specific job-relevant skills, they do enhance trainability, thus making the highly schooled more valuable to employers and making educational credentials a rational screen. The recent human capital–derived version of queuing theory by Moen (1999) extends this reasoning but without offering empirical tests.

Arrow's 1973 article "Higher Education as a Filter" was critical in the development of this area. Arrow offered his filtering, or screening, model of higher education as a departure from the "current human capital orthodoxy" of perfect and complete labor market information. He wanted his model "to formalize views expressed by some sociologists (e.g., Berg). Higher education, in this model, contributes in no way to superior economic performance; it increases neither cognition nor socialization. Instead, higher education serves as a screening device, in that it sorts out individuals of differing abilities, thereby conveying information to the purchasers of labor" (Arrow, 1973, p. 194).

Because Arrow never addressed the question whether more highly schooled workers are necessarily more productive, it does not appear that he took the sociological aspects of filtering very seriously. Arrow's model is really quite different from that of Berg (discussed later) because, in the filtering model, employers still get better workers. For Arrow, filtering adds productivity at the private level if not at the social level (see also Stiglitz, 1975b). This view differs from that of the human capital model, which sees little divergence between private and social benefits; but at the level of job assignment the difference is inconsequential.

Arrow added that higher education offers a double filter. To signal their productive capacity, students first must be admitted to institutions of higher education and then must graduate from them.² This observation directs attention to the relationship between college filtering and on-the-job filtering. As employers observe worker performance—that is, as their information becomes more complete—on-the-job filtering should eventually trump college filtering. Arrow conceded that it is unclear how this occurs, although others have since examined how educational credentials place individuals on career trajectories in which their schooling-acquired skills may not be used in their entry-level jobs but are used as they ascend promotion ladders (Bills, 1988c; Rosenbaum, 1984; Rosenbaum & Binder, 1997; Spilerman & Lunde, 1991). Warren's finding that the effects of education, in particular postsecondary education, decline with age is consistent with a model positing a role for on-the-job filtering (1999, p. 25).

Signaling Theory

Labor market signaling complements labor market screening: Employers screen, and job seekers signal. The signaling position is most closely associated with Spence (1973, 1981), who conceptualized hiring as an investment under uncertainty (Albrecht, 1981; Kroch & Sjoblom, 1992; Perri, 1994). Employers evaluating job candidates have available to them a range of observable personal characteristics (e.g., educational credentials, job experience, race, sex). Spence referred to those that are unalterable as indices and those that are alterable (i.e., those that can be invested in or manipulated, at a cost) as signals. A potential signal becomes an active signal "if the signaling costs are negatively correlated with the individual's unknown productivity" (Spence, 1973, p. 367). Otherwise, everyone would acquire the signal. This negative correlation is a necessary but not sufficient condition for the occurrence of signaling. As Spence argued, "Signals and indices are to be regarded as

parameters in shifting conditional probability distributions that define an employer's beliefs" (pp. 357–358).

Weiss (1995) used "sorting" to include both screening and signaling, seeing them as extensions of human capital models (that is, as accompanying the role of learning in human capital models). For Weiss the difference between screening and signaling models is that, in the former, firms move first and, in the latter, students move first. He maintained that

sorting models subsume all the features of human capital models. In particular, both approaches allow for learning in school (and human capital models require it). In both approaches, profit-maximizing firms compete for utility-maximizing workers, and the expected lifetime compensation of a worker with a given set of observed characteristics is equal to the expected lifetime productivity of a randomly selected worker with those characteristics. Both human capital and sorting models assume that individuals choose a length of schooling that equates their marginal returns from schooling to their cost of schooling. The models differ in that sorting models allow for attributes that are not observed by the firm to be correlated with schooling. (p. 136)

The depiction in signaling theory of the flow of scarce and uncertain information through labor markets would seem to be a promising one for sociologists, but it has been little developed. Borjas (1991, p. 34) observed, "Despite intensive interest in these models at the time of their publication, it is fair to conclude that the signaling literature has not flourished over time. An important drawback of this theoretical approach is the difficulty researchers have had in developing and conducting empirical tests of the key predictions of the theory." In fact, however, the difficulty seems to derive more from lack of interest in measuring key concepts than from a theoretical stance that permits them to be assumed away. Although I will not pursue this subject here, much of the intellectual energy generated by signaling theory eventually went into the literature on the economics of job searching, an increasingly formal endeavor, with simplifying assumptions that have proved too unrealistic for many labor market sociologists (Bull, Ornati, & Tedeschi, 1987; Devine & Kiefer, 1991).

There are exceptions. In a cumulative series of publications, Rosenbaum and his colleagues have fortified the underspecified signaling theory with sociological concepts (Miller, 1998; Miller & Rosenbaum, 1996, 1997, 1998; Rosenbaum, 1986, 1989; Rosenbaum & Binder, 1997). Miller and Rosenbaum (1996, 1997) were skeptical of the applicability of signaling theory to the youth labor market, observing that employers do not use the very signals (i.e., high school grades or employer references) that economic theory predicts they should use (Rosenbaum & Kariya, 1991). Rosenbaum and his colleagues worried that economists had overlooked the fact that signaling processes are embedded in a "social infrastructure" in which employers have different levels of trust in the information they use. Rosenbaum, Kariya, Settersten, and Maier (1990, p. 264) wanted to extend signaling theory to "examine youth's use of signals, employers' use of dubious signals (e.g., age) while ignoring promising ones (e.g., grades), and signals which are efficient in the short-term but not in the long-term."

Another attempt to follow through on the logic of the signaling position comes from Arkes (1999). Arkes wanted to determine if "employers can learn about workers' pre-college cognitive abilities by observing the educational credentials they

obtain, and to assess whether employers value credentials because they signal these cognitive abilities” (p. 133). He used the National Longitudinal Survey of Youth to estimate wage equations for men³ between the ages of 28 and 30. He was particularly interested in the 10 components of the Armed Forces Qualification Test: general science, arithmetic reasoning, word knowledge, paragraph comprehension, numerical operations, coding speed, auto and shop information, mathematics knowledge, mechanical comprehension, and electronics information. Arkes reported that

college attendance appears to be the greatest signal of ability, while an associate’s degree appears not to signal higher ability at all. A high school diploma signals higher abilities associated with paragraph comprehension and math knowledge scores more than for any of the other scores. College attendance has a statistically significant coefficient estimate for each test score, and it signals word knowledge and math knowledge more than other skills. An associate’s degree does not signal significantly higher ability for any skill. A bachelor’s degree signals abilities associated with the three math tests more than any other abilities, and an advanced degree is only a signal of higher verbal abilities. (p. 137)

Arkes concluded that employers value credentials because they signal specific abilities. It is, of course, a considerable step from Arkes’s wage equations to inferences about what employers actually do when confronted with hiring decisions, but his findings are both consistent with the predictions of signaling theory and a rare effort to rigorously confront the theory with data.

Miller (1998) took a similar approach. She observed that although high school grades have no short-term effects on labor market outcomes, they are associated with higher earnings in the long run. Like Arkes, Miller presented no data on employer hiring behavior, although her results (using *High School and Beyond* data) are consistent with field-based interviews with employers that she has reported elsewhere (Miller & Rosenbaum, 1997). Miller conceded the indeterminacy of “whether employers are really benefitting from higher grades or from the greater aptitude that is reflected in higher grades” (1998, p. 306), but she cited other evidence suggesting that long-term productivity is associated most closely with learning.

Finally, Ishida, Spilerman, and Suh (1997) countered signaling theory with versions of human capital and network theory. Their strategy was to examine the effects of the quality of the postsecondary educational institutions that workers had attended on their promotion probabilities in a Japanese firm and a U.S. firm. Ishida et al. reasoned that, according to signaling theory, educational quality differences would matter at the point of organizational entry and would persist as workers acquired tenure. They found limited support for this expectation in both nations. They found some evidence that workers with degrees from more prestigious institutions had greater cognitive skills, but it was not clear whether this resulted from learning or selection.

Interim Assessment of Screening and Signaling Theories

Although often portrayed as a challenge to human capital theory, screening and signaling accounts are better seen as offering incremental adjustments to the theory. Bidwell’s (1989, p. 127) characterization of the relationship between human capital and signaling theories as a “debate” overlooks the affinity between those

models. His distinction between “the symbolic or substantive aspects of education (i.e., signaling)” and “human capital formations” (pp. 133–134) may be less consequential than he maintained. In both accounts, the most highly schooled workers are the most productive (although the way in which this takes place differs), and employers operate wisely by selecting on the basis of credentials.

To summarize, many questions remain unanswered about human capital–derived theories of screening, signaling, and filtering, and one is hard-pressed to see any cumulative or relatively uncontested conclusions or theory. As Card (1999, p. 2) observed, “In the absence of experimental evidence, it is very difficult to know whether the higher earnings observed for better-educated workers are *caused* by their higher education, or whether individuals with greater earning capacity have chosen to acquire more schooling” (see also Altonji & Pierret, 1997, p. 15). The major difficulty is that, although many researchers have been creative in their specification of wage equations, important features of screening models remain untested. We know little, for example, about how schooling-acquired skills are ultimately used in the workplace or how job seekers come to perceive the linkage between credentials and returns. All sorts of attributions and assumptions are made about the motives and behaviors of labor market participants, but verification is lacking. As Tyler (1982, p. 162) observed, human capital theory is limited by the attempts of its practitioners to “redefine the ‘screening’ effect of credentials in such a way that it accords with their basic proposition that education is somehow linked to the performance of work.”

Even when data are used, the exercise often feels perfunctory. Many screening theorists, for instance, have compared the returns of schooling for self-employed workers to those of wage and salary workers (Riley, 1979; Wolpin, 1977). The reasoning here is straightforward enough: The self-employed have no employer to whom they need to signal, so they can pay themselves their true marginal product. This logic holds to the degree that the earnings generated by self-employment and those arising from wages and salaries are strictly comparable. Given the greater variability and volatility of self-employment earnings, however, this seems an overly simple understanding of what self-employment is (Aldrich, Renzulli, & Langton, 1998; Reynolds, 1991). Lazear’s (1977) response that the self-employed use their educational credentials to signal their ability to clients (rather than employers) does little to resolve this concern.

Others have tried to test screening theory by examining how changes occur in the effect of schooling on earnings as individuals accrue work experience. Here, again, the logic is suspect. As Altonji and Pierret (1997) noted,

Although some authors have purported to test screening models by testing whether the coefficient on s [earnings] declines with experience (e.g., Layard & Psacharopoulos, 1974), Riley (1979) and others have noted that unless the relationship between schooling and actual productivity changes, the coefficient on s will not change. This is true regardless of *why* s is related to productivity. (p. 12)

Overall, screening theorists have shown insufficient progress in measurement of the most basic concepts. As Weiss (1995) argued, human capital theory depends fundamentally on the concept of learning. So too does the weak version of screening theory. That is, the acquisition of human capital, so crucial to the theory, is in

the end a theory of how and what people learn and the conditions under which learning takes place. Nonetheless, adherents to these theories show little interest in knowing anything about schools—about what or how people learn. What should be a fundamental aspect of the theory is simply assumed away. The problem is less that learning is poorly measured than that it is ignored.

Control Theory

Bowles and Gintis's 1976 volume *Schooling in Capitalist America* was a powerful statement on the relationships between schools and workplaces. Developing a Marxist critique of schooling and economic production, Bowles and Gintis established the "correspondence principle," whereby schools prepare people to fill slots in capitalist hierarchies. For Bowles and Gintis, the ability of schools to provide or enhance cognitive skills mattered far less than their ability to inculcate noncognitive characteristics. Bowles and Gintis believed that schools do the latter in a class-stratified way. That is, the sons and daughters of the less privileged attend schools in which they are rewarded for docility and passivity, traits that continue to be rewarded on their trajectories to proletarianized labor. At more elite levels of schooling, class reproduction operates by teaching students to be self-reliant and ambitious.

Bowles and Gintis had little to say directly about employer behavior, but their correspondence principle suggests why employers might respond to specific educational credentials in specific ways. More recently, Bowles and Gintis (2002) have deepened their analysis of the role of schools in providing the sorts of noncognitive skills valued by employers. They offer considerable evidence that differences in personality (perhaps attributable to formal schooling) are associated with differences in economic outcomes.

Whatever its importance in reorienting research on the relationship between schools and work, control theory is less of a break with human capital theory than many have claimed (e.g., Leiper, 1993). In both theories, schools change people in ways that make them more attractive to employers. For Bowles and Gintis, no less than for Becker, schools "add value" to potential workers, even if the added value is docility rather than skill in mathematical reasoning. But the theories do differ in other ways. For Bowles and Gintis, capitalists rather than workers benefit most from the institutional structure of schooling. As a theory of job assignment, however, the major difference between control theory and human capital theory is the former's disapproval of the cognitive and affective skills taught in schools as class-biased and class-reproductive. In its explanatory form, control theory is indistinguishable from human capital theory and differs sharply from the strong version of screening theory.⁴

Cultural Capital Theory

Cultural capital theory occupies a strange middle ground as an account of why schooling leads to jobs. There is probably more heterogeneity in the body of literature under the cultural capital umbrella than in any of the other positions that I discuss here, as well as more overlap with other theories (notably, credentialism).

Some cultural capital theorists are concerned primarily with culture, others primarily with capital. The cultural resources available to workers with varying levels of educational attainment can be either enabling or constraining. Kingston (1981), for instance, offered a compelling analysis of "degree prestige" and "credential

cronyism,” in which he described how graduates of elite colleges negotiate their way to elite positions (see also Kingston & Clawson, 1985; Kingston & Smart, 1990). In contrast, Willis’s *Learning to Labour: How Working Class Kids Get Working Class Jobs* (1977) depicted how an adversarial relationship to school culture effectively locks people in less rewarding work lives. While *Learning to Labour* is less an analysis of job assignment than it is an account of cultural resistance, it does illustrate the general point being made here.

If one focuses on capital, the logic of cultural capital theory corresponds closely with that of both human capital theory and control theory. Cultural capital theory maintains that schooling need not enhance productive capacity in the sense of those cognitive or technical skills typically associated with job performance. It holds, rather, that (a) the more highly schooled possess an array of social and interpersonal dispositions that employers value, and (b) employers will use educational credentials to secure employees with the requisite habitus (Bourdieu & Passeron, 1977). The theory is perhaps less clear about whether schooling *imparts* this habitus or merely *rewards* those who have already acquired it in their family and cultural settings.

Cultural capital theory has been valuable as an explanation of how stratification occurs within educational institutions and to some degree as an explanation of the unequal life chances of differently schooled people. As a theory of the relationship between educational credentials and job assignment, however, cultural capital theory has not delivered on what at one time seemed like exceptional promise. Certainly, organizational agents who are charged with hiring for elite and highly privileged positions seem to value certain cultural resources (Kingston, 1981). It seems unlikely, however, that employers can concentrate only on cultural capital (or its absence) when hiring for very specialized technical positions or that they are overly concerned about it when serving as gatekeepers for applicants for lower-status jobs. Promising leads such as Bidwell’s (1989) proposal for a cultural capital approach to job matching have yet to be fully exploited.

Institutional Theory and Chartering Theory

Institutional theory, in particular the strand of it that emphasizes the chartering role of educational credentials, is quite different from the other theories under consideration here. Nevertheless, many of the concerns of institutional theory are similar enough to these accounts to merit a brief look. The literature of institutional theory, most closely associated with Meyer (1970, 1977; Meyer & Rowan, 1977), offers an account of the linkages between schools and workplaces that goes well beyond the issues of limited labor market information and employer behavior, which, to a greater or lesser extent, drive virtually all of the other theories.

Meyer (1977) recognized the direct link between schooling and social position. He stated the “educational allocation” hypothesis as follows: “In modern societies, adult success is assigned to persons on the basis of duration and type of education, holding constant what they may have learned in school” (p. 59). Meyer added that “educational allocation rules give to the schools social *charters* to define people as graduates and as therefore possessing distinctive rights and capacities in society.”

Schools, in this theory, create social categories, many of which are enacted as educational credentials. The content of the schooling matters less than the legitimizing role of the credentials. Stated simply, legitimation matters more than either

allocation or socialization and, in fact, subsumes those processes. Institutional theory shares little with human capital theory, but it has some affinity with both the strong version of screening theory and, in a different way, cultural capital theory. Institutional theory pays little attention to anything that schools might do to change the people passing through them in ways that might interest employers. As I have argued, human capital theory errs in ignoring school learning (which should be a key component of attempts at verifying the model); but this issue is simply not a focus of institutional theory. The theory holds instead that the social effects of schooling emerge regardless of what is or is not learned in school. The persistence of the categories, not the learning presumably indexed by the categories, is the crucial explanatory concept for institutionalists.

Neither Meyer nor other institutionalists have been preoccupied with developing a theory of individual-level job assignment. Rather, their concerns typically are expressed at an aggregate level. They tend to focus on the effects of schooling on broader social structural arrangements and to pay less attention to individual attainment, whether by means of socialization or allocation. Institutional theory provides a plausible explanation for the mass production of credentials. What remains to be established is the linkage of the broader concerns of the theory with empirical data on the behavior of managers and job seekers. To do so would go well beyond my scope here, but as I argue in this article and elsewhere (Bills, 2004), labor market sociologists have much to gain from a more sustained engagement with institutional theory.

Credentialist Theory

The educational credentialist thesis holds that formal schooling leads to socioeconomic success not because of the superior skills and knowledge of the more highly educated, but rather because of the ability of the highly educated to control access to elite positions. In the credentialist view, employers do not examine their own propensity to hire more highly educated workers but, instead, operate on widely shared societal assumptions about the appropriate relationship between schooling and job assignment. Rather than use credentials to secure the most potentially productive workers, employers make choices that are nonrational, unreflective, and at least potentially counterproductive.

The social and historical roots of educational credentialism are complex. After examining the historical record from 1870 to 1930, Brown (1995) wrote in conclusion: "Credentialism was produced by several factors, including educators' conscious (and sometimes unwitting) expansion of higher education, changes in labor market recruitment patterns, and other circumstances with less direct bearing on job training, such as land speculation interests tied to college-founding and the initial absence of government regulation of education" (p. xvii). Dougherty (1994), focusing on the development of the community college, elaborated many similar themes (also see Labaree, 1997; Hogan, 1996).

The credentialist position does not need to posit that education and productivity are unrelated, or even, as Berg (1971) showed, sometimes negatively related. Rather, it needs merely to argue that the ratio between education and productivity is smaller than that between education and rewards (Boylan, 1993). The difference between these ratios is the unearned rent collected by degree holders.

Educational credentialism has come to be linked to the research on two different processes. The first is the "sheepskin effect" (Belman & Heywood, 1991)—

a nonlinear effect of education on earnings, in which a degree provides a larger boost to earnings than does a single year of schooling. While appealing, the logic behind interpreting nonlinear returns as credentialism is not obvious. The most serious objection to this logic is that it offers employers no means to correct their mistakes. Presumably, employers who select job candidates whose educational level exceeds their actual level of skill will adjust for the fact over time by offering fewer promotions and pay raises to the “mismatched” workers. Overvalued employees (the results of employers’ mistakes) should eventually be subject to flatter earnings trajectories.

There is some evidence that employers do make such adjustments as the information available to them on the quality of individual workers becomes more complete. In other words, employers learn. Arkes (1999, p. 134) showed that when credentials are used for hiring but fail to signal real productivity differences, employers learn from the experience and adjust (although the evidence elsewhere is less conclusive—see Bauer and Haisken-DeNew, 2001, for a comparative analysis of employer behavior in Germany and the United States). Arkes added that it “is incorrect to call a wage premium associated with acquiring a credential a return of that credential” (see also Frazis, 1993; Weiss, 1995). Perhaps most to the point, Sorensen (1983) observed that human capital theory does not preclude nonlinearities, although credentialists have not generally heeded this observation.

A second and related phenomenon that is typically linked with credentialism is “credential inflation”: the unreflective employer practice of raising the ante over time in hiring standards. That subject is often associated with Berg (1971), who held that “employers are among the groups contributing to the current emphasis on education, and, since job opportunities are so intimately linked with the well-being of our citizens, employers’ use of educational requirements in the labor market becomes strategically important” (p. 12).

Credentialism in this sense entails social costs. As Boylan (1993, p. 207) pointed out, “credentialists do not anticipate that increasing education should have much effect on overall output. They expect that the principle effect of expanding education should be to raise the credentials necessary to get a given job and point out that expanding educational requirements have accompanied the rising education of the past few decades.”⁵ Labaree (1997) goes beyond this, seeing rampant credentialism as destructive of democratic values in education.

Two presentations of credentialism have become the received wisdom among sociologists. These are Berg’s *Education and Jobs: The Great Training Robbery* (1971, commonly known by its subtitle) and Collins’s *The Credential Society: An Historical Sociology of Education and Stratification* (1979). Indeed, Kingston’s (n.d., p. x) remark that *The Great Training Robbery* is now more “ritually cited” than critically read applies with equal force to *The Credential Society*.

Berg’s critique was largely a corrective to the idea that ever-increasing amounts of education and training were the key to economic growth and prosperity, a position with support among policymakers even now. He argued that the American labor market was characterized by excessive preoccupation with educational credentials whose relevance to work performance was dubious at best and an elaborate shell game at worst. For Berg, employers’ decisions to use educational credentials as selection devices had no basis in any evidence that those credentials were associated in any meaningful way with actual skill demands, worker productivity,

turnover, or anything else. Economists and sociologists were as guilty as employers in their failure to examine the contribution of schooling to productivity.⁶

Collins used the concept of credentialism to develop a sophisticated theoretical account of the role of formal schooling in the social stratification of contemporary societies (see also Collins, 1971, 1974). Building on Weberian theory, Collins claimed that “education is an artificial device for monopolizing access to lucrative occupations” (1979, p. 9). He added that “the demands of any occupational position are not fixed, but represent whatever behavior is settled upon in bargaining between the persons who fill positions and those who attempt to control them” (p. 27). Whereas for Berg credentialism grew out of employer and societal inattention to rationality, for Collins power and access to elite positions were at the forefront.⁷

Key to Collins’s analysis is his focus on the history of ethnic and cultural conflict, rooted in turn-of-the-century immigration. This aspect of Collins’ theory is often overlooked, and Brown (1995), in particular, has challenged the empirical adequacy of his account of ethnicity. Nevertheless, that account is crucial in that it provides Collins with a nontechnocratic causal mechanism to explain rising educational requirements beyond the broader and more empirically elusive “education craze” that drives Berg’s model.

In fact, Collins’s demolition of what he called “the myth of technocracy” was complete. He saw little linkage between the form and content of school-acquired skills, on the one hand, and productivity and the demands of the workplace, on the other. If *The Credential Society* is Weberian in the breadth of its analysis, it is virtually Latourian in its deconstruction of the relationship between schools and the workplace.

Berg and Collins are not the last word on credentialism, and questions remain unsettled. Attempts to test Collins’s model empirically have fared less well than his own admittedly exploratory analysis of the San Francisco Area Employer Survey (1971, 1974; see Gordon & Thal-Larsen, 1969). Tyler (1982) offered a generally unconvincing path analysis, while Leiper’s (1993) empirical test of human capital versus signaling versus credentialism suffered from problematic derivation and specification of hypotheses.

Like human capital–derived sorting theories, credentialist theories disagree on who moves first. Brint (1998) gives primacy to degree holders (buttressed by their affiliation with professional associations and other powerful constituencies), defining credentialism as “the monopolization of access to the more rewarding jobs and economic opportunities by the holders of educational degrees and certificates” (p. 176). Boylan (1993, p. 206) generally agrees, saying, “Credentialists hold that education operates by conferring status rather than skills, which groups and individuals use in competing for income and other rewards.” Bridges (1996, p. 173), in contrast, focuses on “the preoccupation of employers with employees having crossed one or more educational status thresholds.” Labaree (1997) sees credentialism as embedded in American cultural and economic history, beyond the motives of specific employers or job seekers.

Analysts also differ on the level of the educational system at which credentialist processes come into play. Some see credentialism throughout the educational and occupational hierarchy. Labaree (1997) portrays a growing divergence between the exchange value of educational credentials and actual school learning. In his account, “overcredentialing” is a mismatch of skill demands and required credentials at all educational levels. Labaree is less specific than is Collins (1979) about the causal

forces at work, presenting an analysis more similar to Berg's (1971) depiction of unreflective and somewhat unconstrained employer preferences. Hogan (1996) sees the historical development of educational credentialing as linked to proletarianization, which has shifted American workers out of commodity markets and into labor markets.

Others see credentialism as operating primarily at upper levels. The most sustained statement here is Brown's *Degrees of Control: A Sociology of Educational Expansion and Occupational Credentialism* (1995), which held that "many U.S. occupations [are] accessible only to persons who hold college degrees" (p. xvii). Similarly, Kingston (1981) focused on credentials as the route to elite professional positions.

Fevre, Rees, and Gorard (1999), drawing on observational data from Wales, offered an interesting interpretation of credentialism. They described "instrumental credentialism" as one of a number of orientations toward education that individuals might hold. This orientation, sharply different from human capital or even screening theory, holds that

people do not value ET [education and training] for itself but for the qualifications it brings. An *instrumental credentialist* orientation accepts the doctrine that educational credentials (or, more rarely, training credentials) are required in order to improve labour-market chances. . . . [I]ndividuals still consider the content of their ET to be relatively unimportant and are not thinking that they should be acquiring knowledge or skills which will make them better at their jobs. This is not their aim, nor their concern. (p. 128)

Fevre et al. observed that this ideal typical orientation of the *instrumental credentialist* is behaviorally close to a *functional avoidance* orientation. Here, "finding utility in the credentials that ET can bring appears to be quite compatible with a rejection of any other utility in such activity" (1999, p. 129). However cynical, these ideal types probably offer a more plausible account of what actually motivates people's behavior than do economic models.

Interim assessment of credentialism. Of all the models presented here, credentialism may be the most contested, the most prone to differing interpretations, and the most inconsistently specified. Its meaning ranges from the (problematic) claim that educational credentials are empty of informational value to the (undeniable) claim that the level of schooling needed to get a given job has risen over time. Nevertheless, credentialist theory—not theories of screening, signaling, filtering, control, or even cultural capital—is where the true break with human capital theory occurs. Berg's depiction of a "great training robbery" was more of a challenge to the status quo than even the boldest portrayals of sorting machines or sites of reproduction.

One cost of this break is that economists have routinely dismissed credentialist arguments, even when claiming to take them seriously (e.g., Arrow, 1973). Weiss (1995, p. 150) writes, "So why the resistance [among labor economists] to sorting [i.e., screening and signaling] models? I believe there are several sources. First, sorting models are mistakenly grouped with credentialism, in which wage differences are independent of productivity differences, or with models in which education has no effect on productivity." The idea that wage differences might have little to do with productivity is anathema to many economists.⁸

If anathema to some, however, credentialist theory offers considerable theoretical leverage for understanding both employer behavior on one level and social structural change on another. It is difficult to imagine a human capital–derived theory giving up the claim that changes in employers’ demands for skills and credentials are based on real changes in the workplace. According to human capital theory, at any given level of skill supply among job seekers, the hiring criteria used by employers are derived from processes of technological change, workplace organization, and enhanced managerial efficiencies. In this view, profit-maximizing employers are unlikely to raise hiring standards unless induced to do so by these sorts of changes.

In sharp contrast, credentialist theories locate changes in employer preferences and practices in processes of credential inflation that often originate in the educational system itself. Although credentialists may sometimes be too quick to dismiss the explanatory role of technological and other innovations, the theory is at least able to accept the possible role of innovation as an empirical question in a way that human capital theory is not. As long as the rationality of employer behavior remains an issue to be settled by data, a fully specified credentialist theory can subsume, or at least incorporate, the best of human capital and related theories.

Nonetheless, sociologists have, thus far, rarely specified or tested credentialist models with any greater attention to measurement or hypothesis testing than have economists with their sorting models. To be sure, the data demands are awesome. As Bidwell (1989) noted,

A well-designed empirical effort to clarify the issues posed between advocates of human capital and signaling theory would entail independent measures of (1) work productivity; (2) years of completed education, weighted by curricular content; (3) certification; (4) trained capacity; and (5) various elements of cultural capital. Such research would pose formidable problems. (p. 134)

What Can We Make of All of This? Some Broad Social Trends and Some Needed Conceptual and Empirical Work

There is little consensus about why employers assign jobs on the basis of the educational credentials of job candidates. What follows are some considerations that should be kept in mind as we attempt to resolve this puzzle. My strategy is to discuss some broad social trends in the United States that can be expected to influence the relationship between educational credentials and job assignment and thus to illustrate the conceptual and empirical work that is needed. The trends are (a) the proliferation and diversification of credentials, including those acquired through distance education and those acquired after labor market entry (the latter is closely associated with changes in the American life course); (b) the proliferation and diversification of work settings in which school–work relationships exist (i.e., a labor market that is increasingly fragmented—even polarized—in the opportunities and prospects offered to workers); and (c) changes in the returns of skill and education.

The Proliferation and Diversification of Credentials

Educational credentials are more varied than analysts sometimes recognize. Job assignment based on educational qualifications involves not only ever higher educational requirements but also ever more specialized ones. Educational expansion

brings about both sorts of diversification. As Bidwell (1989, p. 125) noted, “persistence in school tends to be accompanied by increasingly specialized courses of study.” The students face a bewildering array of degrees at the sub-baccalaureate level of community colleges and technical institutes (Kerckhoff, 1996, p. 51; Kerckhoff & Bell, 1998) and a vast and uncharted assortment of certificates, licenses, and other nondiploma credentials. Likewise, although educational quality is an elusive empirical construct, there is little doubt that the educational experiences indicated by otherwise identical credentials vary widely (Ishida et al., 1997).

As the supply of credentials multiplies and becomes more variable, the role of credentials in labor markets will probably diversify as well. Information-rich credentials conferred by socially trusted schools and certifying bodies may become more tightly linked with labor market outcomes, perhaps favoring a human capital explanation. Some credentials may continue to signify an entirely different sort of information to gatekeepers for more elite positions: The value of a prestigious degree is unlikely to decline, whatever the level of knowledge that is actually gained in pursuit of the degree. This prospect would seem to offer support for cultural capital theory. In still starker contrast, credentials may be trusted yet provide misleading information about productive capacity, indicating the value of a credentialist account. Whichever theory best fits the data (and it is unlikely that any of the seven types of theories will stand up best in all labor market segments), analysts will need to be increasingly attentive to the diversity of educational credentials.

As educational credentials have proliferated, they have come to be acquired at different points in people’s lives (Jacobs & Stoner-Eby, 1998; Marcotte, 1999; Pallas, 1993). Adults are returning to school in ever greater numbers, and job assignment often precedes the attainment of educational credentials. Under these conditions, the capacity of credentials to signal otherwise unobservable information about productive capacity is transformed. Particularly when employers are providers or sponsors of adult education, the role of credentials in modern labor markets—their informational value—becomes less clearly defined by standard theoretical apparatuses.

Nock (1993) has defined credentials as “something that gives an individual access to credit or confidence” (p. 45). Clearly, however, the credit and confidence that accompany credentials is variable. At the least, we are going to need to pay strict attention to the source of educational credentials and the point in the life course at which they are acquired.

The Proliferation and Diversification of Work Settings

As educational credentials and the conditions of their acquisition have proliferated, so have the work setting in which job transactions take place (Cappelli, Bassi, Katz, Knoke, Osterman, & Useem, 1997). Without trying to defend the point in detail here, there is every reason to expect the relationship between school and work to vary across occupations, communities, specific credentials, and labor market cycles. As Bridges (1996, p. 173) suggested, “education can play a different role in different labor market contexts” (see also Altonji & Pierret, 1997, p. 25; Arum, 1998).

This is not a new insight. Spence (1973, p. 359) observed that “a characteristic may be a signal with respect to some types of jobs but not with respect to others,” and the economist’s P-test is sensitive to variations across industrial settings. In

fact, there has been substantial field-based and survey research on the behavior of employers in specific labor markets in the past 2 decades (Althausen & Appel, 1996; Barron, Bishop, & Dunkelberg, 1985; Bills, 1988a, 1988b, 1988c, 1992a, 1992b, 1999; Bishop & Barron, 1984; Braddock, Crain, McPartland, & Dawkins, 1986; Bridges & Villemez, 1986; Crain, 1984; Holzer, 1996; Kirschenman & Neckerman, 1991; Miller & Rosenbaum, 1996, 1997, 1998; Natriello, 1988; Rosenbaum, 1986, 1989; Rosenbaum & Binder, 1997). This work has done a great deal to clarify what employers look for when they hire. As an example, Holzer's (1996) survey of employers in four large cities presented abundant empirical data on labor markets (most important, on the structure of the demand side). He observed the detrimental effects of many employer skill requirements on the job prospects of Blacks and Hispanics and was also attentive to effects on women.

Many field-based researchers make good use of sociological and economic theories of the labor market. Certainly, this work is no less theoretically informed than that underlying other research designs. Still, little of this work has deductively and systematically tested hypotheses drawn from the seven models discussed in this article. In what was probably the most systematic effort to do so, Bills (1983, p. 20) came to a somewhat agnostic conclusion:

While adherents to any of these theories can find some support in the results, a more even-handed appraisal must conclude that none of the theories is unambiguously supported, and all in fact face some disconfirming evidence. Human capital theory is weakened by the finding that very few employers believe that job-related skills must be acquired in school, suggesting that most perceived a somewhat loose relationship between the tasks and activities of schools and those of the workplace. Educational screening theory is challenged by the willingness of employers to trade away educational credentials, and by the considerable extent to which employers see skills as acquired in school. There is simply little evidence that many employers behave in the ways attributed to them by credentialists.

Bills (2004) has more recently argued that different conclusions might be reached from the more demanding labor markets of the 1990s. There is some irony in the possibility that just as U.S. sociologists are jettisoning human capital theory, recent labor market trends give some sign of having caught up with the theory. While still theoretically inconclusive, the body of field-based research on employer behavior has begun to yield a cumulative set of empirical findings, and there are indications that the findings are evolving into a coherent theoretical account as well. The attention to employer behavior is important. It may be that the postwar institutional economists were right all along and that the most important labor market processes are local (Lester, 1954; Malm, 1954, 1955; Reynolds, 1951). There is no substitute for the direct observation of employers and job seekers.

The Increasing Returns of Credentials and Skills

The widely debated increase in the economic returns of education and skill is turning out to be a complicated issue. Hauser, Warren, Huang, and Carter (1996, p. 13) reported that the effects of schooling on occupational status have not generally risen over time (an exception being the increasing value of high school graduation among young Black men) but that the effects of education on earnings have been increasing and "schooling has become more important because levels of edu-

cational attainment have increased” (p. 18; see also Boylan, 1993; Hout, 1997). Other evidence suggests that postsecondary credentials now matter only when accompanied by sophisticated cognitive skills (Pryor & Schaffer, 1999; see also Kane & Rouse, 1995; Krueger, 1993). I quote here at length some important findings:

Taken together, these labor market trends suggest the following conclusions. First, education credentials are an increasingly important determinant of demand for labor, which, in turn, affects wages. Second, it is not clear whether employers are increasingly relying on education credentials as a method of screening for the skills they need, or whether these credentials are merely a proxy of increasing importance for some necessary skill (perhaps the ability to learn quickly). Third, the demand (as evidenced by the growing wage premium) for mathematics skills has grown. It may be that these skills serve as a proxy for some other important skill (such as problem-solving ability). Fourth, since wage inequality has also increased *within* educational categories, some aspect of supply and demand (above and beyond educational credentials) is at work in the labor market. This could be some unmeasured competencies. Or it could be luck. Or it could be something else. Fifth, the use of computers is likely to be an important part of the “something else.” Finally, it is simultaneously true that both educational credentials and something beyond educational credentials have become increasingly important in determining employers’ demand for workers, and therefore, the wages that workers earn. It is likely that both competence *and* credentials are increasingly in demand by employers. (Bassi, 1999, p. 16)

It is premature to conclude that the “Credential Society” is coming to an end, and in fact there is nothing in the theory that *inherently* limits it to the production of educational credentials in formally chartered educational institutions (see also Nock, 1993). Nevertheless, employers are probably reading signals and establishing screens differently from the way they did those things 30 years ago. Stacey (1999, p. 1) noted that “employers are beginning to view diplomas and degrees with skepticism as technological and structural changes escalate. Employers are beginning to seek new signals in recruiting or retraining employees. Initial signs of competencies developed through computer-based learning are becoming one of the alternative signals.” As Miller and Rosenbaum (1997), Bills (1992b), and others showed, hiring criteria are mutable. Any given criterion works only to the extent that employers trust it as a source of information. There are indications, at this point primarily anecdotal, that employer trust is shifting from traditional educational credentials to such presumably more information-rich markers of skill acquisition as episodes of industry-certified training.

Economists have often asked why employers do not minimize their information costs by seeking screens that are less costly—both to them and to society—than educational credentials. In particular, the empirical puzzle has been why American employers, unlike their counterparts in much of the world, avoid standardized tests as a cheap alternative to massive public investments in higher education. For the most part, the testing option is offered as a foil—even the most rationality-driven labor economists do not seem to anticipate seriously the development of a workplace counterpart to the Educational Testing Service (Altonji & Pierret, 1997, p. 26).

There may, however, be some developing skirmishes between the publicly chartered system of educational credentials and an emerging infrastructure of independent testers and certifiers. Bassi (1999, p. 18) believes that there is a trend

toward using tests as hiring criteria, an observation based on some reasonable empirical evidence. This trend, along with the proliferation of credentials and their shifting meaning to employers, will continue to transform the “Credential Society.” But any shift in the *specific* credentials that are recognized and rewarded by employers hardly signals an end to credentialism as a pervasive organizing mechanism for labor markets. Failing the development of a mechanism that solves all problems of incomplete and asymmetric labor-market information, employers and job seekers are going to need to rely on some form of social credit.

Conclusions

It is as difficult to imagine a perfectly Bergian world of orthogonal schooling and workplaces as it is to imagine their seamlessness in a Beckerian one. We now know that it is too simple to assert that credentials perfectly indicate skills or that they are used solely to exclude groups lacking credentials from positions of wealth and influence. This does not mean that the right answer lies somewhere in the middle, but it does suggest that we need a focused program of research that is cognizant of the kinds of social change that have taken place since the theories were first advanced.

Better data and measurement will solve a lot of problems. Sociologists and economists alike have yet to do the hard work of specifying and measuring the core concepts underlying theories of human capital, screening, credentialism, and the rest. These efforts need to be carried out across the full gamut of labor market sectors, under varying conditions of labor market stringency. I close with some observations on how this work might progress.

I noted at the beginning of this article that I was focusing rather narrowly on job assignment in U.S. labor markets and not on occupational status, earnings, or other societies. My concern is with assessing theories of the middle range. Most of the theories at stake here, of course, are pitched more broadly than this, with some claiming far greater scope than the issue of how workers and jobs are matched in labor markets. As least as formulated by Collins (1979) and Brown (1995), for instance, credentialist theory is primarily a sociohistorical account of *collective* mobility. Similarly, human capital theory was never intended to be limited to individual-level wage models, having from its inception more societal-level aspirations (Schultz, 1962).

What unites these middle-level conceptions (at least many of them) is that, however conceptualized and operationalized, they focus on how the behaviors of employers and job seekers, embedded in an institutional and cultural setting, culminate in labor market transactions. The degree to which this is seen as arbitrary, socially unproductive, inefficient, irrational, or exploitative varies. My final comments center on some specific empirical and theoretical questions about job assignment that I think will help to bring us closer to a satisfactory middle-range theory of schooling and socioeconomic attainment.

Broadly, what is needed is a theory that (a) has the explanatory potential of credentialism but (b) leaves room for the autonomous or exogenous (yet socially embedded) effects of technological change that have generally been taken most seriously by human capital theorists and (c) explains the role of information in labor markets from both the screening/employer side and the signaling/worker side. Such an account would subsume what is of value in human capital theory and control theory and could be at least consistent with institutional theory.

An important advantage of credentialist theory is that, to a greater degree than the other theories at stake here, it can take the motivations of labor market participants as empirical questions to be investigated rather than as behavioral assumptions that cannot be readily challenged. Once human capital theorists' employers have selected workers on nonrational grounds, the theory collapses. The problem is not quite as serious in such human capital-derived theories as screening and control, but even there the scope for variation in employer behavior is quite narrow. Credentialist theory, in contrast, predicts that employers will select on the basis of credentials and will do so increasingly over time; but it can leave open the question of whether they are right to do so. Employers may well be (and in some settings probably are) acting rationally in these decisions.

A successful theory, however, cannot begin with the extreme assumption that what is learned in school bears no relationship to what employers need. Nor can it simply accept that changes in the world of work never induce changes in the skills demanded in the workplace. Indeed, much of the research on the "high performance organization" that has emerged in postindustrial societies over the past 2 decades suggests that human capital theory describes these processes better now than it did when the theory was developed (Appelbaum & Batt, 1994). Again, we need to ask empirical questions rather than beginning with assumptions about the answers.

Finally, we need to know much more about the role of information in labor markets—what information is sought, why some sources are trusted, how reliable or flawed the information may be, and so on. Many of the most useful concepts (still, as argued here, badly underexploited) will come from the signaling literature. As the information available to employers expands (through both the proliferation of credentials and the availability of information technology), the ability of the informational value of credentials to cut through the expanded volume of noise will take on a more important role in job assignment.

The focal point of this program of research would be employers, with great attention to the institutional and market factors impinging on their ability to make decisions about hiring and promotion. As the material reviewed in this article illustrates, such a program would be methodologically highly diverse, drawing on the efforts of case study, historical, ethnographic, survey, comparative, and other styles of research. We need to examine in greater depth how employer behavior pertaining to job assignment—and hence the linkage between schooling and achievement—is influenced by, for example, occupational associations, gatekeepers, licensing, labor market stringency, and political maneuvering and bargaining within firms. Without disparaging the existing work in this area, we need something more than an exclusive reliance on wage models.

I have focused here on the United States, but any worthwhile account of the linkages between schools and workplaces will need to be tested across societies and across historical periods. A useful model here is the Europe-based Transitions in Youth project (Muller & Shavit, 1998; see also Ishida et al., 1997; Kerckhoff, 1995). The contributors to this effort have taken seriously the premise that the relationship between credentials and jobs varies across institutional settings in ways that often defy grand theories of job assignment. Some systems promote credentialist sorts of behavior, while in others more straightforward human capital processes seem to dominate. Likewise, more research with the historical breadth of Collins's work (2000) will illuminate how systems of allocation vary across time and space.

Understanding the mechanisms that produce the empirical association between educational credentials and job assignment goes to the heart of theory and research in social stratification. It is unfair, however, to criticize the research community too harshly for not yet resolving this question. The meaning of credentials—which includes both their value as indicators of productivity and their use as means of social closure—varies too greatly to permit any definitive assessment of whether schooling is a socially productive investment or a “training robbery.”

Notes

I greatly appreciate the generous comments that I received from David Brown, Randall Collins, and Yossi Shavit. Any mistakes are my own.

¹ It was, however, clear to Sorokin. In a remarkable passage, he wrote:

Up to the last few years, the school was regarded primarily as an educational institution. Its social function was seen in “pouring” into a student a definite amount of knowledge, and, to some extent, in shaping his behavior. The testing, the selective, and the distributive functions of the school were almost completely overlooked, although these functions of the school are scarcely less important than that of “enlightenment” and “education.” During the last few years many specialists in different fields have begun to see these functions. At the present moment it is certain that the school, while being a “training and educational” institution, is at the same time, a piece of social machinery, which tests the abilities of the individuals, which sifts them, selects them, and decides their prospective social position. In other words, *the essential social function of the school is not only to find out whether a pupil has learned a definite part of a textbook or not; but through all its examinations and moral supervision to discover, in the first place, which of the pupils are talented and which are not; what ability every pupil has and in what degree; and which of them are socially and morally fit; in the second place, to eliminate those who do not have the desirable moral and mental qualities; in the third place, through an elimination of the failures to close the doors for their social promotion, at least, within certain definite social fields, and to promote those who happen to be the bright students in the direction of those social positions which correspond to their general and specific abilities.* (1927/1959, p. 188; italics in original)

Sorokin anticipated virtually every major position on the relationship between schooling and socioeconomic success that developed in the next 75 years.

² Arkes (1999), without explicitly building on Arrow, later developed this reasoning at some length. I discuss his work later in this article.

³ The restriction to men is neither unusual nor defensible. Leiper (1993) is critical of the neglect of gender in this literature.

⁴ Livingstone (1998) offers a neo-Marxist analysis of educational credentials and jobs that, unlike Bowles and Gintis (1976), self-consciously breaks with the human capital position. Much of his critique is persuasive, although it is not altogether clear what mechanisms Livingstone would identify as producing the relationship between credentials and attainment.

⁵ This seemingly simple sentence raises two large empirical issues that are beyond the scope of this review but need to be acknowledged. First, the hypothesis that employer demands for credentials have outpaced any legitimate workplace needs leads to a large and contentious literature on overeducation or overqualification (Burris, 1983; Halaby, 1994; Robst, 1995; Sicherman, 1991). Second, the relationship between the number of

credentials of a given sort at a given historical moment and the exchange value of those credentials is, contrary to what many credentialists have assumed, essentially indeterminate (Boylan, 1993; van der Ploeg, 1994). The value of credentials usually grows, at least up to a point, as they become more common. Thus credentials may be positional goods in the sense elaborated by Hirsch (1978), but they do not operate in any simple linear way. Both of these issues are relevant to the questions being pursued here but require sustained treatments in their own right.

⁶ Dore's *The Diploma Disease* (1976a; see also 1976b) followed shortly after and claimed that credentialism characterized the developing world as well. Other works also identified educational credentialism throughout the developing and developed world (Hallak & Caillods, 1980; Oxenham, 1984).

⁷ If less sustained in their treatment of educational credentialism, other sociological theorists of this era were raising similar questions (see, e.g., Murphy, 1988, on social closure and Parkin, 1971, on various forms of social exclusion).

⁸ An interesting example of economists' resistance to more sociological models is Eli Ginzberg's skeptical foreword to Berg's *The Great Training Robbery*.

References

- Akerloff, G. A., & Yellen, J. L. (1986). *Efficiency wage models of the labor market*. New York: Cambridge University Press.
- Albrecht, J. W. (1981). A procedure for testing the signaling hypothesis. *Journal of Public Economics*, 15, 123–132.
- Aldrich, H. E., Renzulli, L. A., & Langton, N. (1998). Passing on privilege: Resources provided by self-employed parents to their self-employed children. *Research in Social Stratification and Mobility*, 16, 291–317.
- Althausen, R. P., & Appel, T. (1996). Education and credentialing systems, labor market structure and the work of allied health occupations. In A. C. Kerckhoff (Ed.), *Generating social stratification: Toward a new research agenda* (pp. 223–255). Boulder, CO: Westview Press.
- Altonji, J. G., & Pierret, C. R. (1997). *Employer learning and the signaling value of education* (Report NLS 97-35). Washington, DC: U.S. Department of Labor, Bureau of Labor Statistics.
- Appelbaum, E., & Batt, R. (1994). *The new American workplace: Transforming work systems in the United States*. Ithaca, NY: ILR Press.
- Arabsheibani, G. R., & Rees, H. (1998). On the weak vs. strong version of the screening hypothesis: A re-examination of the P-test for the U.K. *Economics of Education Review*, 17, 189–192.
- Arkes, J. (1999). What do educational credentials signal and why do employers value credentials? *Economics of Education Review*, 18, 133–141.
- Arrow, K. J. (1973). Higher education as a filter. *Journal of Public Economics*, 2, 193–216.
- Arum, R. (1998). Invested dollars or diverted dreams: The effect of resources on vocational students' educational outcomes. *Sociology of Education*, 71, 130–151.
- Baron, J. N., & Hannan, M. T. (1994). The impact of economics on contemporary sociology. *Journal of Economic Literature*, 32, 1111–1146.
- Barron, J. M., Bishop, J., & Dunkelberg, W. C. (1985). Employer search: The interviewing and hiring of new employees. *Review of Economics and Statistics*, 67, 43–52.
- Barron, J. M., Black, D. A., & Loewenstein, M. A. (1987). Employer size: The implications for search, training, capital investment, starting wages, and wage growth. *Journal of Labor Economics*, 5, 76–89.

- Bassi, L. J. (1999). Are employers' recruitment strategies changing? Competence over credentials. In N. G. Stacey (Ed.), *Competence without credentials* (pp. 13–27). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.
- Bauer, T. K., & Haisken-DeNew, J. P. (2001). Employer learning and the returns to schooling. *Labour Economics*, 8, 161–180.
- Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. New York: National Bureau of Economic Research.
- Belman, D., & Heywood, J. (1991). Sheepskin effects in the return to education. *Review of Economics and Statistics*, 73, 720–724.
- Berg, I. (1971). *Education and jobs: The great training robbery*. Boston: Beacon Press.
- Bidwell, C. E. (1989). The meaning of educational attainment. *Research in the Sociology of Education and Socialization*, 8, 117–138.
- Bills, D. B. (1983). *Employers, credentials, and staffing: Hirings and promotions in an urban labor market*. Paper presented at the annual meeting of the Midwest Sociological Society, Chicago.
- Bills, D. B. (1988a). Educational credentials and hiring decisions: What employers look for in entry-level employees. *Research in Social Stratification and Mobility*, 7, 71–97.
- Bills, D. B. (1988b). Credentials and capacities: Employers' perceptions of the acquisition of skills. *Sociological Quarterly*, 29, 439–449.
- Bills, D. B. (1988c). Educational credentials and promotions: Does schooling do more than get you in the door? *Sociology of Education*, 61, 52–60.
- Bills, D. B. (1992a). A survey of employer surveys: What we know about labor markets from talking with bosses. *Research in Social Stratification and Mobility*, 11, 3–31.
- Bills, D. B. (1992b). The mutability of educational credentials as hiring criteria: How employers evaluate atypically highly credentialed candidates. *Work and Occupations*, 19, 79–95.
- Bills, D. B. (1999). Labor market information and selection in a local restaurant industry: The tenuous balance between rewards, commitments, and costs. *Sociological Forum*, 14, 583–607.
- Bills, D. B. (2004). *Education and work: A sociological perspective*. London: Blackwell.
- Bishop, J., & Barron, J. M. (1984). Stockpiling job applicants. In *Industrial Relations Research Association 37th Annual Proceedings* (pp. 107–113). Madison, WI: Industrial Relations Research Association.
- Borjas, G. (1991). Skills and productivity in the American economy. *Advances in the Study of Entrepreneurship, Innovation, and Economic Growth*, 5, 17–40.
- Bourdieu, P., & Passeron, J. (1977). *Reproduction in education, society and culture*. London: Sage Publications.
- Bowles, S., & Gintis, H. (1976). *Schooling in capitalist America*. New York: Basic Books.
- Bowles, S., & Gintis, H. (2002). *Schooling in capitalist America* revisited. *Sociology of Education*, 75, 1–18.
- Bowman, M. J. (1966). The human investment revolution in economic thought. *Sociology of Education*, 39, 111–137.
- Boylan, R. D. (1993). The effect of the number of diplomas on their value. *Sociology of Education*, 66, 206–221.
- Braddock, J. H., II, Crain, R. L., McPartland, J. M., & Dawkins, R. L. (1986). Applicant race and job placement decisions: A national survey experiment. *International Journal of Sociology and Social Policy*, 6, 3–24.
- Bridges, W. P. (1996). Educational credentials and the labor market: An inter-industry comparison. In A. C. Kerckhoff (Ed.), *Generating social stratification: Toward a new research agenda* (pp. 173–199). Boulder, CO: Westview Press.
- Bridges, W. P., & Villemez, W. J. (1986). Informal hiring and income in the labor market. *American Sociological Review*, 51, 574–582.

- Brint, S. (1998). *Schools and societies*. Thousand Oaks, CA: Pine Forge.
- Brown, D. K. (1995). *Degrees of control: A sociology of educational expansion and occupational credentialism*. New York: Teachers College Press.
- Brown, S., & Sessions, J. G. (1999). Education and employment status: A test of the strong screening hypothesis in Italy. *Economics of Education Review*, 18, 397–404.
- Bull, C., Ornati, O., & Tedeschi, P. (1987). Search, hiring strategies, and labor market incentives. *Journal of Labor Economics*, 5, S1.
- Burris, B. H. (1983). *No room at the top: Underemployment and alienation in the corporation*. New York: Praeger.
- Cappelli, P., Bassi, L., Katz, H., Knoke, D., Osterman, P., & Useem, M. (1997). *Change at work*. New York: Oxford University Press.
- Card, D. (1999). The causal effect of education on earnings. In O. Ashenfelter & D. Card (Eds.), *Handbook of labor economics: Vol 3* (pp. 1801–1864). Amsterdam: North-Holland Publishing.
- Chiswick, B. R. (1973). Schooling, screening, and income. In L. C. Solmon & P. J. Taubman (Eds.), *Does college matter? Some evidence of the impacts of higher education*. New York: Academic Press.
- Collins, R. (1971). Functional and conflict theories of educational stratification. *American Sociological Review*, 36, 1002–1019.
- Collins, R. (1974). Where are educational requirements for employment highest? *Sociology of Education*, 47, 419–442.
- Collins, R. (1979). *The credential society: An historical sociology of education and stratification*. New York: Academic Press.
- Collins, R. (2000). Comparative and historical patterns of education. In M. T. Hallinan (Ed.), *Handbook of the sociology of education* (pp. 213–239). New York: Kluwer Academic/Plenum.
- Crain, R. L. (1984). *The quality of American high school graduates: What personnel officers say and do about it* (Center for Social Organization of Schools Report #354). Baltimore, MD: Center for Social Organization of Schools, Johns Hopkins University.
- Devine, T. J., & Kiefer, N. M. (1991). *Empirical labor economics: The search approach*. New York: Oxford University Press.
- Dore, R. P. (1976a). *The diploma disease*. London: Allen & Unwin.
- Dore, R. P. (1976b). Human capital theory, the diversity of societies, and the problem of quality in education. *Higher Education*, 5, 79–102.
- Dougherty, K. (1994). *The contradictory college: The conflicting origins, impacts, and futures of the community college*. Albany: State University of New York.
- Fevre, R., Rees, G., & Gorard, S. (1999). Some sociological alternatives to human capital theory and their implications for research on post-compulsory education and training. *Journal of Education and Work*, 12, 117–140.
- Frazis, H. J. (1993). Selection bias and the degree effect. *Journal of Human Resources*, 28, 538–554.
- Gordon, M. S., & Thal Larsen, M. (1969). *Employer Policies in a Changing Labor Market*. Berkeley: Institute of Industrial Relations, University of California.
- Granovetter, M. (1988). The sociological and economic approaches to labor market analysis: A social structural view. In G. Farkas & P. England (Eds.), *Industries, firms, and jobs: Sociological and economic approaches* (pp. 187–216). New York: Plenum.
- Grubb, W. N. (1993). Further tests of screening on education and observed ability. *Economics of Education Review*, 12, 125–136.
- Halaby, C. N. (1994). Overeducation and skill mismatch. *Sociology of Education*, 67, 47–59.
- Hallak, J., & Caillods, F. (1980). *Education, work and employment, Vol. I: Education, training and access to the labor market*. Paris: International Institute for Educational Planning, UNESCO.

- Hamilton, G. S., & Roessner, J. D. (1972). How employers screen disadvantaged job applicants. *Monthly Labor Review*, 95(9), 14–21.
- Hauser, R. M., Warren, J. R., Huang, M., & Carter, W. Y. (1996). *Occupational status, education, and social mobility in the meritocracy* (Center for Demography and Ecology Working Paper 96-18). Madison, WI: Center for Demography and Ecology, University of Wisconsin.
- Hirsch, F. (1978). *Social limits to growth*. Cambridge, MA: Harvard University Press.
- Hogan, D. (1996). “To better our condition”: Educational credentialing and “the silent compulsion of economic relations” in the United States, 1830 to the present. *History of Education Quarterly*, 36, 243–270.
- Holzer, H. A. (1996). *What employers want: Job prospects for less educated workers*. New York: Russell Sage.
- Hout, M. (1997). *Speed bumps on the road to meritocracy: Occupational mobility of women and men in the U.S., 1972–1994*. Unpublished manuscript.
- Ishida, H., Spilerman, S., & Suh, K. H. (1997). Educational credentials and promotion chances in Japanese and American organizations. *American Sociological Review*, 62, 866–882.
- Jacobs, J. A., & Stoner-Eby, S. (1998, September). Adult enrollment and educational attainment. *Annals, American Academy of Political and Social Science*, 559, 91–108.
- Kane, T., & Rouse, C. (1995). Labor market returns to two- and four-year colleges. *American Economic Review*, 85, 600–614.
- Kerckhoff, A. C. (1976). The status attainment process: Socialization or allocation? *Social Forces*, 55, 368–381.
- Kerckhoff, A. C. (1995). Institutional arrangements and stratification processes of industrial societies. *Annual Review of Sociology*, 21, 323–347.
- Kerckhoff, A. C. (1996). Building conceptual and empirical bridges between studies of educational and labor force careers. In A. C. Kerckhoff (Ed.), *Generating social stratification: Toward a new research agenda* (pp. 37–56). Boulder, CO: Westview Press.
- Kerckhoff, A. C., & Bell, L. (1998). Hidden capital: Vocational credentials and attainment in the United States. *Sociology of Education*, 71, 152–174.
- Kingston, P. W. (1981). The credential elite and the credential route to success. *Teachers College Record*, 82, 589–600.
- Kingston, P. W. (n.d.). *Can education “grow” the economy?* Unpublished manuscript.
- Kingston, P. W., & Clawson, J. G. (1985). Getting on the fast track: Recruitment at an elite business school. *International Journal of Sociology and Social Policy*, 5, 1–17.
- Kingston, P. W., & Smart, J. C. (1990). The economic pay-off of prestigious colleges. In P. W. Kingston & L. S. Lewis (Eds.), *The high-status track: Studies of elite schools and stratification* (pp. 147–174). Albany: State University of New York.
- Kirschenman, J., & Neckerman, K. M. (1991). “We’d love to hire them, but . . .”: The meaning of race for employers. In C. Jencks & P. E. Peterson (Eds.), *The urban underclass* (pp. 203–232). Washington, DC: Brookings Institution Press.
- Kroch, E. A., & Sjoblom, K. (1992). Schooling as human capital or a signal: Some evidence. *Journal of Human Resources*, 29, 156–180.
- Krueger, A. B. (1993). Have computers changed the wage structure? Evidence from Microdata, 1984–1989. *Quarterly Journal of Economics*, 58, 33–60.
- Labaree, D. F. (1997). *How to succeed in school without really learning: The credentials race in American education*. New Haven, CT: Yale University Press.
- Layard, R., & Psacharopoulos, G. (1974). The screening hypothesis and the returns to education. *Journal of Political Economy*, 82, 985–998.
- Lazear, E. (1977). Academic achievement and job performance: A note. *American Economic Review*, 67, 252–254.
- Leiper, J. M. (1993). Gender, education and socioeconomic status: Economic theories, credentialism and beyond. *Canadian Journal of Higher Education*, 23, 19–36.

- Lester, R. A. (1954). *Hiring practices and labor competition*. Princeton, NJ: Princeton University, Industrial Relations Section.
- Liu, P., & Wong, Y. (1982). Educational screening by certificates: An empirical test. *Economic Inquiry*, 20, 72–83.
- Livingstone, D. W. (1998). *The education–jobs gap: Underemployment or economic democracy*. Boulder, CO: Westview Press.
- Logan, J. A. (1996). Opportunity and choice in socially structured labor markets. *American Journal of Sociology*, 102, 114–160.
- Malm, F. T. (1954). Recruiting patterns and the functioning of labor markets. *Industrial and Labor Relations Review*, 7, 507–525.
- Malm, F. T. (1955). Hiring procedures and selection standards in the San Francisco Bay Area. *Industrial and Labor Relations Review*, 8, 231–252.
- Manski, C. F. (1993). Adolescent econometricians: How do youth infer the return to schooling? In C. Clotfelter & M. Rothschild (Eds.), *Studies of supply and demand in higher education* (pp. 43–60). Chicago: University of Chicago Press.
- Marcotte, D. E. (1999). *Learning in the labor market: The changing importance of education and training after “formal” schooling ends* (MDS-1275). Berkeley: National Center for Research in Vocational Education, University of California.
- Merton, R. K. (1967). On sociological theories of the middle range. In R. K. Merton, *On theoretical sociology: Five essays, old and new* (pp. 39–72). New York: Free Press.
- Meyer, J. W. (1970). The charter: Conditions of diffuse socialization in schools. In W. R. Scott (Ed.), *Social processes and social structures*. New York: Holt, Rhinehart, & Winston.
- Meyer, J. W. (1977). The effects of education as an institution. *American Journal of Sociology*, 83, 55–77.
- Meyer, J. W., & Rowan, B. (1977). Institutionalized organizations: Formal structure as myth and ceremony. *American Journal of Sociology*, 83, 340–363.
- Miller, P. W., & Volker, P. A. (1984). The screening hypothesis: An application of the Wiles test. *Economic Inquiry*, 22, 121–127.
- Miller, S. R. (1998). Shortcut: High school grades as a signal of human capital. *Educational Evaluation and Policy Analysis*, 20, 299–311.
- Miller, S. R., & Rosenbaum, J. E. (1996). *The missing link: Social infrastructure and employers’ use of information* (Working Paper #96-15). Chicago: Center for Urban Affairs and Policy Research, Northwestern University.
- Miller, S. R., & Rosenbaum, J. E. (1997). Hiring in a Hobbesian world: Social infrastructure and employers’ use of information. *Work and Occupations*, 24, 498–523.
- Miller, S. R., & Rosenbaum, J. E. (1998, August). *What do grades mean?* Paper presented at the annual meeting of the American Sociological Association, San Francisco.
- Mincer, J. (1958). Investment in human capital and personal income distribution. *Journal of Political Economy*, 66, 282–302.
- Mincer, J. (1989). Human capital and the labor market: A review of current research. *Educational Researcher*, 18(4), 27–34.
- Moen, E. R. (1999). Education, ranking, and competition for jobs. *Journal of Labor Economics*, 17, 694–723.
- Muller, W., & Shavit, Y. (1998). The institutional embeddedness of the stratification process: A comparative study of qualifications and occupations in thirteen countries. In Y. Shavit & W. Muller (Eds.), *From school to work: A comparative study of educational qualifications and occupational destinations* (pp. 1–48). Oxford, UK: Clarendon Press.
- Murphy, R. (1988). *Social closure: The theory of monopolization and exclusion*. Oxford, UK: Cambridge University Press.
- Natriello, G. (1988). *What do employers want in entry-level workers? An assessment*. Washington, DC: Office of Educational Research and Improvement.

- Nock, S. L. (1993). *The costs of privacy: Surveillance and reputation in America*. New York: Aldine de Gruyter.
- Oxenham, J. (1984). *Education versus qualifications: A study of relationships between education, selection for employment and the productivity of labor*. London: Allen & Unwin.
- Pallas, A. M. (1993). Schooling in the course of human lives: The social context of education and the transition to adulthood in industrial society. *Review of Educational Research*, 63, 409–447.
- Parkin, F. (1971). *Class inequality and political order: Social stratification in capitalist and communist societies*. New York: Praeger.
- Perri, T. J. (1994). Testing for ability when job assignment is a signal. *Labour Economics*, 1, 365–381.
- Pryor, F. L., & Schaffer, D. L. (1999). *Who's not working and why: Employment, cognitive skills, wages, and the changing U.S. labor market*. Cambridge, UK: Cambridge University Press.
- Psacharopoulos, G. (1979). On the weak versus the strong version of the screening hypothesis. *Economics Letters*, 4, 181–185.
- Reynolds, L. G. (1951). *The structure of labor markets*. New York: Harper.
- Reynolds, P. D. (1991). Sociology and entrepreneurship: Concepts and contributions. *Entrepreneurship theory and practice*, 16, 47–70.
- Riley, J. G. (1976). Information, screening and human capital. *American Economic Review*, 66, 254–260.
- Riley, J. G. (1979). Testing the educational screening hypothesis. *Journal of Political Economy*, 87, S227–S252.
- Robst, J. (1995). College quality and overeducation. *Economics of Education Review*, 14, 221–228.
- Rosenbaum, J. E. (1984). *Career mobility in a corporate hierarchy*. New York: Academic Press.
- Rosenbaum, J. E. (1986). Institutional career structures and the social construction of ability. In J. G. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 139–171). New York: Greenwood.
- Rosenbaum, J. E. (1989, Winter). What if good jobs depended on good grades? *American Educator*, 10–15, 40–43.
- Rosenbaum, J. E., & Binder, A. (1997). Do employers really need more educated youth? *Sociology of Education*, 70, 68–85.
- Rosenbaum, J. E., & Kariya, T. (1991). Do school achievements affect the early jobs of high school graduates in the United States and Japan? *Sociology of Education*, 64, 78–95.
- Rosenbaum, J. E., Kariya, T., Settersten, R., & Maier T. (1990). Market and network theories of the transition from high school to work: Their application to industrialized societies. *Annual Review of Sociology*, 16, 263–299.
- Schultz, T. W. (1962). Investment in human beings. *Journal of Political Economy*, 70, 1–8.
- Sicherman, N. (1991). “Overeducation” in the labor market. *Journal of Labor Economics*, 9, 101–122.
- Smith, M. R. (1990). What is new in “new structuralist” analyses of earnings? *American Sociological Review*, 55, 827–841.
- Sorensen, A. B. (1983). Sociological research on the labor market: Conceptual and methodological issues. *Work and Occupations*, 10, 261–287.
- Sorokin, P. A. (1959). *Social and cultural mobility*. Glencoe, IL: Free Press. (Original work published in 1927)
- Spence, M. A. (1973). Job market signalling. *Quarterly Journal of Economics*, 87, 355–374.

- Spence, M. A. (1981). Signalling, screening, and information. In S. Rosen (Ed.), *Studies in labor markets* (pp. 319–357). Chicago: University of Chicago Press.
- Spilerman, S., & Lunde, T. (1991). Features of educational attainment and job promotion prospects. *American Journal of Sociology*, 97, 689–720.
- Spring, J. H. (1989). *The sorting machine revisited: National educational policy since 1945*. New York: Longman.
- Stacey, N. G. (1999). Introduction. In N. G. Stacey (Ed.), *Competence without credentials* (pp. 1–3). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.
- Stigler, G. (1962). Information in the labor market. *Journal of Political Economy*, 70, S94–S105.
- Stiglitz, J. E. (1975a). Incentives, risk, and information: Notes towards a theory of hierarchy. *Bell Journal of Economics*, 6, 552–578.
- Stiglitz, J. E. (1975b). The theory of “screening,” education, and the distribution of income. *American Economic Review*, 65, 283–300.
- Swedberg, R. (1997). New economic sociology: What has been accomplished, what is ahead? *Acta Sociologica*, 40, 161–182.
- Sweetland, S. (1996). Human capital theory: Foundations of a field of inquiry. *Review of Educational Research*, 66, 341–360.
- Taubman, P. J., & Wales, T. J. (1974). *Higher education and earnings*. New York: McGraw-Hill.
- Thurow, L. (1975). *Generating inequality*. New York: Basic Books.
- Tucker, I. B., III. (1985). Use of the decomposition technique to test the educational screening hypothesis. *Economics of Education Review*, 44, 321–326.
- Tyler, W. (1982). Complexity and control: The organisational background of credentialism. *British Journal of Sociology of Education*, 3, 161–172.
- van der Ploeg, S. (1994). Educational expansion and returns on credentials. *European Sociological Review*, 10, 63–78.
- Warren, J. R. (1999). *Changes with age in the process of occupational stratification*. Unpublished manuscript.
- Weiss, A. (1995). Human capital vs. signalling explanations of wages. *Journal of Economic Perspectives*, 9, 133–154.
- Wiles, P. (1974). The correlation between education and earnings: The external-test-not-content hypothesis (etnc). *Higher Education*, 3, 43–58.
- Willis, P. E. (1977). *Learning to labour: How working class kids get working class jobs*. Westmead, UK: Saxon House.
- Wolpin, K. I. (1977). Education and screening. *American Economic Review*, 67, 949–958.

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