A word to the reader on how this paper was written. I have followed, and contributed to, the literature on the economics of higher education for over 30 years and have accumulated a sizable library of books, articles, and documents that I have judged worth keeping. In preparing for this paper, I have gone through that library and pulled out those items that seemed most relevant. I do not suggest that what follows is comprehensive or exhaustive; in some respects, it reflects a personal view of the topic, organized in part by my memory of how the subject evolved in professional and public discussion. I suspect, however, that another writer would not prepare a paper radically different from this one, for I think the story is fairly clear and not terribly controversial.
Economic Outputs—Demand Side Analysis

Although a starting point for this discussion is essentially arbitrary, I think most economists would agree that the seminal work in modern times dates to the early 1960s, when the human capital model (or metaphor) was elaborated in the work of Gary Becker, Theodore Schultz, Jacob Mincer, and others. Publication of Becker’s *Human Capital* (1964) brought this concept to the forefront of economic theorizing and moved the subject far beyond prior anecdotal discussion of the economic value of higher education. Becker’s intent was to demonstrate, both theoretically and empirically, that investment in people was analogous to investment in physical capital and could be measured in much the same way. Using 1950 census data, he estimated the private rate of return to college graduation at 13 percent (Becker 1975), a rate higher than that generally obtainable on investments in physical capital. He also computed a social rate of return and found that to be only slightly less, close to 12.5 percent (Becker 1975). (The private rate-of-return calculations compare the student’s personal costs, including forgone earnings, to after-tax earnings, while the social rate of return compares the full economic costs of education to before-tax earnings.) The result was a powerful analytical model that provided hard economic evidence of the value of higher education in the labor market. This evidence, in turn, helped to fuel the demand for access to college as the story made its way via columnists and reporters into the popular media.

Becker also considered an issue that continues to cloud discussion of this subject to the present day—the correlation between ability and education. In more current jargon, we would describe this problem as one of selectivity bias, in that higher education opportunities are not randomly distributed among the population. Perhaps what has been attributed to college education is really attributable to inherent skills and abilities. In popular terms, if Harvard takes in students from the top 1 percent of the talent pool and graduates them four years later still in the top 1 percent, then what is the value-added of the Harvard education?

If Harvard takes in students from the top 1 percent of the talent pool and graduates them four years later still in the top 1 percent, then what is the value-added of the Harvard education? Becker’s analysis persuaded him that only a small proportion (12 percent) of the rate of return was attributable exclusively to ability, reducing his rate-of-return estimate from 13 percent to 11.5 percent (Becker 1975), but the issue continues to haunt serious students of this topic.

Starting from an entirely different framework, Edward Denison’s work in the early 1960s on sources of economic growth provided additional evidence of the economic importance of higher education (Denison 1962). Denison painstakingly measured the inputs of labor, land, and capital in the production of national output and was left with a sizable unexplained residual not attributable to the basic inputs. He concluded that this residual was a measure of improvement in education of the labor force and the application of new knowledge, amounting together to as much as 43 percent of the total contribution to economic growth (Leslie and Brinkman 1988). Thus, Denison’s work provided further confirmation of the basic point developed by Becker in the human capital model.

The story moves on to the 1970s, when the labor market for college graduates went into severe decline. Emblematic of the work in this period, Richard B. Freeman published in 1976 a popular book titled (ominously) *The Over-Educated American*. At last it appeared that the remarkable growth in numbers of college graduates in the post-World War II era was having the expected effect—a decline in the wage premium for such graduates. Indeed, Freeman calculated that the private rate of return in 1973...
might have fallen as low as 7.5 percent (Freeman 1976). Freeman’s rather glum conclusion was:

Overall, the period of severe “overeducation” is likely to last for about a decade, to be followed by a period of market balance at a lower plateau. In contrast to the past, higher education will be a “marginal” investment, not a sure “guarantee” to relatively high salaries and occupational standing, whose expansion will reduce its benefits. (p. 188)

As is so often the case with long-term projections, Freeman’s proved inaccurate, for in the early 1980s the bottom dropped out of the labor market for high school graduates, resulting in a sharp increase in the relative value of a college degree (Leslie and Brinkman 1988). (It is unclear which economists first documented the turnaround, but one early article is Murphy and Welch 1989. Frank Levy was also reporting on the change at roughly the same time.) Indeed, the wage premium to a college degree over a high school diploma largely persists to this day. The experience of the 1970s appears in retrospect to have been isolated and possibly nonrecurring.

A further development in recent years has added nuance to labor market studies of returns to higher education. The advent in the 1970s of longitudinal-survey data sets sponsored by various federal agencies has provided labor economists with a richer source of information than the age-earnings profiles created from census data that they used to rely on. These surveys (National Longitudinal Survey [NLS], National Longitudinal Survey of Youth [NLSY], High School and Beyond [HSB], and National Education Longitudinal Study [NELS]) have allowed economists to track the early educational and labor market experience of specific individuals and to control for family background and other socioeconomic variables as well. Certain surveys have also provided information on participants’ high school transcripts, as well as the names of the colleges attended, allowing for more fine-grained analyses including evaluation of the returns to college quality. The more recent College and Beyond data set, sponsored by The Andrew W. Mellon Foundation, has even allowed for some tentative attempts to overcome selection bias (Dale and Krueger 1999). Indeed, the data sets are beginning to allow economists to address such specific questions as whether Harvard is worth a $125,000 investment (Kahn 2000). As the price of prestigious college and university attendance has soared, these types of questions are of increased relevance to parents and policy makers. Current work by Robert Zemsky and colleagues in compiling surveys of alumni for individual colleges may lead to a time when prospective students can receive far more information about what they may expect subsequent to graduation than has been available heretofore.

The preceding summary, highly truncated and selective as it may be, nonetheless documents the area of greatest success in defining and measuring labor market, or demand-side, outcomes of higher education. Assessment of other college and university outputs has been less successful, although many have been identified and cataloged. We turn now to these other outputs, both economic and noneconomic in nature, which I call supply-side outputs. I use this term because much of the literature approaches this issue through the lens of university production, often for the purpose of providing useful information for college and university administrators.

College and University Outputs—Supply-Side Analysis

In 1970, three organizations concerned with higher education, the Western Interstate Commission for Higher Education (WICHE), the American Council on Education (ACE), and the Center for Research and Development in Higher Education (CRDHE) at the University of California, Berkeley, cosponsored an invitational conference, “The Outputs of Higher Education: Their Identification, Measurement, and Evaluation,” in Washington, D.C.
Those who wrote papers and participated in the discussion included such notable figures as Fred Balderston, Alain Enthoven, John Brandl, C. West Churchman, Alex Mood, Alice Rivlin, Alexander Astin, John Vaizey, David Brown, Kenneth Tollett, and John Perry Miller. The ensuing publication included a framework for organizing and measuring the multiple outputs of higher education identified during the conference (Lawrence, Weathersby, and Patterson 1970, 112–113). The editors organized their list into four categories: instructional outputs, institutional environment outputs, research outputs, and public service outputs. The design was intended primarily to assist institutions in collecting data for their own graduates and campuses, although national or state-level agencies could also follow this format.

The main criticism that one could level at the list and possible measures is that the focus is on quantity rather than quality. For example, research outputs include number of books and articles published, number of patents, and the like. Obviously, the quality and value of research varies widely, and simply counting books, articles, and patents does not capture those differences (and yet, how common it is for promotion-and-tenure committees to focus on quantity without properly evaluating quality!).

In any event, my purpose in drawing attention to this long-forgotten document is to indicate that 30 years ago some very bright people spent considerable time thinking about this issue, and yet very little seems to have come from that effort. Some institutions collect some of these data, and some measures (particularly of the institutional environment) show up in college guidebooks, but many of the concepts remain unmeasured and unused. Several conclusions seem to follow: (1) the absence of such data is not a result of conceptual problems, for this early inventory is a rich source of ideas; (2) demand for such data may be minimal and not perceived as important by administrators; and (3) the principal conceptual problem is the assessment of quality, not quantity.

Reverting to my historical approach, it is also notewor-thy that the 1970s saw a remarkable outpouring of books and articles devoted to the noneconomic benefits of college attendance. Howard Bowen’s important volume, *Investment in Learning*, published in 1977, is probably the best representative of this approach. I think it is not accidental that, at the very time the economic return to college-going was in decline (see the discussion above), supporters of higher education chose to emphasize outcomes of a social and cultural dimension. Bowen (pp. 55–59) provides his own extensive list of potential outcomes for higher education. He includes both private, nonpecuniary benefits, such as personal self-discovery; psychological well-being; values and morals; refinement of taste, conduct, and manner; and health, as well as broader social outcomes, such as advancement of knowledge, preservation and dissemination of our cultural heritage, and progress toward the identification and solution of social problems. Presumably, students may place a value on the private, nonpecuniary benefits of higher education, if they know and understand them, and may incorporate them into the investment decision. Those benefits that are public in nature, however, and not fully captured by the student are externalities that may warrant public subsidy to induce socially optimal levels of enrollment. Indeed, the presumed presence of such externalities (both pecuniary and nonpecuniary) provide one of the rationales for public subsidy of higher education. Bowen’s volume is a notable attempt to document and argue for reasons to attend college, both for the individual and for society, that go beyond simple wage gains in the labor market.

During the 1970s, a number of scholarly efforts were designed to document empirically, where possible, many of these less tangible benefits (or outcomes) of higher education. (An excellent summary article is Alexander 1993.) With the resurgence of a significant wage premium paid to college graduates over high school graduates, however, such research has languished. Apparently, when the direct economic argument for college attendance can be made, scholars and others lose interest in the social and cultural arguments that are trotted out when
labor markets for graduates go sour. As a result, not much research on social or public benefits has been done of late, and indeed, some of us worry that we are in danger of losing the very language of that discourse. It is interesting, in that context, to note that a recent publication of the Institute for Higher Education Policy in Washington, D.C. (1998), was devoted to an elementary presentation of the matrix of private and social pecuniary and nonpecuniary benefits, largely to explain to a new generation of policy analysts what those terms mean.

It is worth noting that some prominent economists have raised questions about the presence and magnitude of many of the noneconomic benefits emphasized by Howard Bowen. Writing in their popular book *Free to Choose: A Personal Statement*, Milton and Rose Friedman express great skepticism about social benefits of higher education:

> When we first started writing about higher education, we had a good deal of sympathy for the first justification [social benefits as a basis for subsidy]. We no longer do. In the interim we have tried to induce the people who make this argument to be specific about the alleged social benefits. The answer is almost always simply bad economics. . . . Occasionally the answer is good economics but is supported more by assertion than by evidence. . . . The [Carnegie] Commission contented itself with concluding that “no precise—or even imprecise—methods exist to assess the individual and societal benefits as against the private and public costs.” But that did not prevent it from recommending firmly and unambiguously an increase in the already massive government subsidization of higher education. In our judgment this is special pleading, pure and simple. (Friedman and Friedman 1990, 178–180)

I believe that the Friedmans’ skepticism has not been answered definitively, and perhaps cannot be. On matters of this sort, my experience suggests that policy makers and citizens either believe the argument or they do not, and the relatively weak evidence that one can provide rarely changes anyone’s opinion. Of course, social benefits (or externalities) are not the only reason for subsidy—equal opportunity, access, and equity also figure into the discussion. But one would have to say that the scholarly community has been unable to answer the Friedmans convincingly and with hard evidence, a sign that our ability to measure many of the alleged outcomes of higher education is woefully inadequate to the task.

**Institutional Data—Further Supply-Side Analysis**

The final area I want to consider is the literature focused explicitly on higher education production. This body of work covers not only highly theoretical studies but also more practical managerial approaches to resource allocation within the university.

One of the best early theoretical pieces still worth considering is a 1972 article by Marc Nerlove, then of the University of Chicago. One of the more interesting aspects of his article was Figure 1, which explores the relationship of undergraduate education to graduate education and research. Arguments about whether these activities are complements or substitutes are found throughout the literature and are hotly debated today, particularly in discussions about forces increasing college costs. Nerlove argued that the answer is not a simple either/or but rather that it depends on the balance between the two. As the figure suggests, at extreme concentrations of one activity or the other, there is a range of complementarity where an institution can raise both outputs without further inputs. In the broad operating range of today’s research university, however, he suggests that substitution and competition for resources is to be expected. This debate has been joined as recently as early 2000, when a group of about 20 economists were invited to a conference in New York to consider competing
visions put forward on these issues by Gordon Winston and by William Massy and Robert Zemsky. Following several hours of discussion, the issues remained unresolved—an example of the limitations of theoretical analysis in this arena.

Two other works of a similar nature bear mentioning as examples of the type of research conducted on the supply-side of higher education. The first, by David Garvin (1980), examines the economics of university behavior, with a theoretical model that assumes prestige maximization as the overall objective. Garvin uses the model to explore issues of resource allocation, particularly investment in doctoral programs.

The second volume, by David S. P. Hopkins and William Massy (1981), is a comprehensive treatment of a decade of research conducted at the University of California, Berkeley and Stanford University on mathematical planning models for the university. This book is a mathematically sophisticated treatment of a diverse array of topics, including budget projections, production and cost models, endowment management, and analysis of faculty appointment, promotion, and retirement policies. The techniques employed involve microeconomic theory, optimization models, and others drawn from the field of operations research. This book is an elegant example of the sophistication that this field had achieved nearly 20 years ago, but I believe it is accurate to say that few institutions make use of the techniques proposed. The university may simply be too political and too ambiguous an organization to treat realistically in this hyperrealistic framework.

Hopkins (1990) has written a more recent article as well, focusing on the higher education production function and its limitations. This is one of the best articles available on the subject, providing a clear discussion of the relevant work in the field and its strengths and limitations. This paper should be the starting point for anyone seeking to explore this topic. Regrettably, the author concludes that a production function for higher education will never be fully specified because “there are simply too many intangibles relating to the abilities of various key actors to contribute to the process of education and research in ways that never will be very well understood” (p. 32).

At a more nuts and bolts level, one can note Peter Ewell’s 1983 volume, for the National Center for Higher Education Management Systems (NCHEMS), on student outcomes. Ewell has been an active participant in the assessment movement, promoted most enthusiastically by the American Association for Higher Education (AAHE). Ewell’s text provides yet another inventory of institutional outcomes, as well as a summary of several national data sources that indicates which source has information on each of several student outcomes. Clearly, scholars in this partic-
ular area are not wanting for concepts and possible measures; what is unclear is the degree to which colleges and universities are actually making use of such instruments in their day-to-day work. The annual assessment conferences sponsored by AAHE draw many hundreds of participants, but I am unable to say anything definitive about the practical results, if any, achieved through this effort. Few economists seem to participate in this work, ceding the field to sociologists, anthropologists, psychologists, and students of organizational behavior. An indication that little of substance has been achieved is the search that the National Center for Public Policy and Higher Education recently conducted for state-level data on student learning as part of a state report card on higher education (National Center for Public Policy and Higher Education 2000). Although the center staff and the advisory panel, which I chair, had hoped to include state-level data on collegiate learning outcomes, there were absolutely no usable data sets that we could locate. As a result, each state received an incomplete in this category.

Conclusion

This hasty survey of nearly 40 years of research on outputs of higher education suggests three conclusions. First, the demand-side analysis of labor market outcomes, largely focused on economic returns, continues to be a productive area for research and new findings. New data sets continue to be developed, allowing economists to probe more deeply into the connection between education and labor market results. The problem of selectivity bias continues to haunt much of this research, however.

Second, the discussion of public or social benefits, particularly of the nonpecuniary variety, languishes unattended and ignored for the most part. Even if a stronger incentive were present to explore this area further, it is not clear exactly what methods or what new data would yield stronger conclusions than those previously developed. This may be an area better left to political persuasion and oratory.

Third, the study of university production, although never likely to yield the type of analytical elegance that many might desire, can still produce practical and useful results—not only for the scholarly community but for the practitioner world as well. Indeed, as governors, legislators, and other state officials press universities for increased accountability, efforts to define and measure learning outcomes, however distasteful to college faculty, should have a high priority in future research. Much might be learned, for example, by examining the techniques used by for-profit institutions such as the University of Phoenix, which are strongly outcome oriented.

REFERENCES


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