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Studies of Supply and Demand in Higher Education

Edited by

Charles T. Clotfelter
and
Michael Rothschild

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Preface

In 1989 the National Bureau of Economic Research launched a program on the economics of higher education. Although numerous NBER studies have touched on economic aspects of education, previous to this effort the National Bureau had sponsored only a limited number of studies focused solely on education.¹ Similar to those operating in other areas of applied economic analysis, such as labor and public economics, the NBER program in higher education has sponsored research projects and periodic meetings at which scholars discuss ongoing and completed research. The program's first research project focused on three topics of current policy significance: the demand for undergraduate education, the supply of faculty, and the rise in the cost of higher education. This investigation culminated in the publication of *Economic Challenges in Higher Education* (1991, University of Chicago Press), by Charles T. Clotfelter, Ronald G. Ehrenberg, Malcolm Getz, and John J. Siegfried. The aim of this volume was to frame each of these questions in economic terms and to discuss data and empirical research that would be useful in answering them.

The program's working group on higher education met three times in 1989 and 1990 in Cambridge, Massachusetts, with some 35 NBER research associates and other economists participating. Unlike most groups of economists who study an industry, all of the participants had first-hand experience with "firms" in this industry, and a few were current or past administrators, includ-

1. Among these sponsored studies are *Education, Income, and Human Capital* (1970), edited by W. Lee Hansen; *Schooling, Experience, and Earnings* (1974), by Jacob Mincer; *Higher Education and Earnings: College as an Investment and Screening Device* (1974), by Paul J. Taubman and Terence Wales; *The Effect of School Quality on Achievement, Attainment Levels, and Lifetime Earnings* (1975), by Paul Wachtel; *The Definition of College Quality and Its Impact on Earnings* (1975), by Lewis C. Solomon; and *Education as an Industry* (1976), edited by Joseph T. Froomkin, Dean T. Jamison, and Roy Radner.

ing several deans and provosts and one former president. While some of the participants brought with them considerable experience in research on higher education, others were experts in fields such as labor economics and industrial organization who were applying economic models to higher education for the first time. It became clear from the meetings of this group that higher education offered numerous questions to which economic analysis might be fruitfully applied.

In light of these possibilities for applying economic approaches, the editors in 1990 invited a number of scholars to write papers for a conference devoted specifically to research on the economics of higher education. Authors were encouraged to present new empirical findings and to discuss issues of methodology that arise in the study of higher education. The authors could also consider the effects of public policy, but in accordance with the practice followed in Bureau studies, published papers can offer no policy recommendations. In commissioning these studies, we did not attempt to achieve comprehensive coverage of all aspects of the economics of higher education. Rather we sought to have solid research done on important topics, particularly topics that had previously not received a great deal of careful analysis by economists. The conference was held in May 1991 in Williamsburg, Virginia, with drafts presented and discussed that corresponded to the chapters in the current volume. Following the conference, the authors revised their papers, and the assigned discussants put their comments into written form.

The objective of a conference such as this one is to foster research on an important topic of study in two ways—directly, through the published papers themselves, and indirectly, through the subsequent research that this work will stimulate. We believe not only that the first objective has been achieved but that there is every prospect for success on the second as well. The chapters contained here provide new insights on important issues and raise a host of questions that should motivate future research.

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Charles T. Clotfelter and Michael Rothschild

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Introduction

Charles T. Clotfelter and Michael Rothschild

Higher education in the United States is an enterprise of large proportions and far-reaching effects. There are today some 3,400 separately governed colleges and universities, ranging in size from colleges with a few hundred students to giant state universities enrolling tens of thousands. In 1990 these institutions together enrolled 14.2 million students and made expenditures amounting to 2.8 percent of gross national product (Clotfelter et al. 1991, 3; U.S. Department of Education 1991a, table 29; 1991b, table 1). At current rates of educational attainment, more than a quarter of all adults will have completed four years of college by middle age (U.S. Bureau of the Census 1990, table 217). Higher education not only affects the overall level of productivity in the economy but also is a major factor in determining the distribution of income.¹ It also has widespread effects through the research undertaken at universities, although those effects are difficult to quantify.

One distinctive feature of higher education in this country is the existence of a sizable private nonprofit sector. In this sector are some of the country's most prominent colleges and universities. But the public sector, in the form of community colleges and state-supported colleges and universities, remains larger than the private and in fact constitutes one of the most important activities of state government, providing service functions to agriculture, industry, and local governments, in addition to research and teaching functions. Relative to other industries of comparable size, higher education has distinctive

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1. For an analysis of the relationship between college enrollment trends and recent changes in earnings differentials, see Murphy and Welch (1989).

features. Among them are the high degree of autonomy accorded to one group of employees—the faculty—and their nonhierarchical organization.²

As a subject of economic analysis, higher education is certainly not unexplored territory. Despite the inherent difficulties in attempting to undertake objective analysis of one's own industry, a significant number of economists have devoted scholarly attention to colleges and universities. For example, economists have used the human capital model to examine such topics as the decisions of individuals to undertake the investment in college and the impact of college training on their subsequent earnings. There has also been considerable attention to policy issues related to student demand, such as the impact of tuition levels and scholarship programs on the number and composition of students entering college. A second major component of the literature on higher education has been supplied by labor economists, who have applied their tools of analysis to the academic job market. In addition, economists have examined a variety of other topics, such as research expenditures, productivity, and implications of public subsidies to state institutions.³

Despite the advances made by this research, the trends and debates of the last decade make it clear that there is much about the higher education industry that we still do not know. Although a decade of growth for higher education, the 1980s were also a period in which problems and criticisms became more prominent. Colleges and universities consistently raised their tuitions faster than inflation, prompting critics to call them “greedy” and inefficient (see, e.g., Bennett 1987, A31; *Washington Post Weekly* 1989; Finn 1984, 29–33, 47–51). Between 1979 and 1987, for example, tuition and fees increased in real terms at an average rate of 3.0 percent a year in public institutions and 4.9 percent a year in private institutions.⁴ Combined with reductions in federal funding for student aid grants, these increases raised concerns about the ability of low- and middle-income students to afford to attend college. One aspect of the existing financial aid system that came under special scrutiny was the practice, by several groups of selective private institutions, of comparing and adjusting the financial aid offers made to individual students. Defended as a means to take financial considerations out of college choice, this practice was investigated by the Justice Department as a possible antitrust violation. More generally, there were increasing signs that colleges were using marketing techniques and non-need-based scholarships often to attract top applicants. The academic job market also presented new challenges. One study (Bowen and Sosa 1989) predicted that during the period 1997 to 2002, shortages of arts and sciences faculty could develop on the order of 40 percent. After a decade of slack demand for Ph.D.'s in many fields, some questioned whether gradu-

2. For a discussion of the internal organization of universities, see Coleman (1973).

3. For references to the economic research on higher education, see, for example, Bowen (1968), Radner and Miller (1975), Froomkin et al. (1976), Hoenack and Collins (1990), and Clotfelter et al. (1991).

4. Calculations based on figures in Clotfelter et al. (1991), 125.

ate programs would attract the number and quality of applicants necessary to sustain research and graduate education at previous levels.

When confronted with issues such as these, economists see questions not unlike those that arise in the study of other industries in the economy. In particular, economists have tended to ask two basic questions about higher education: What mix of products does the higher education industry produce, and at what cost? Who pays for these products, and who benefits from them? The eight studies in this volume are no exception. Although most of them examine topics that have received relatively little attention to date, the studies presented here are concerned with these two basic issues. Two of the studies focus primarily on the first question. Rothschild and White examine the nature of competition in the higher education industry. Merton's chapter is an analysis of how universities ought to manage their endowments, which is nothing more than using resources efficiently. Successful endowment management should reduce costs. Five studies (those by Manski, Hauser, Cook and Frank, Green, and Ehrenberg, Brewer, and Rees) address different aspects of who chooses to purchase what kind of education and why. The chapter by Quigley and Rubinfeld addresses both questions as it attempts to explain why in some states taxpayers pay for extensive (and expensive) systems of higher education while in others the variety and quality of state-subsidized higher education is more limited. A brief overview of these studies reveals the economic content in the issues they raise.

In the first chapter of this volume, Michael Rothschild and Lawrence White look at how individual institutions operate within a larger marketplace. Although it should not be surprising that economists looking at higher education might view colleges and universities in much the same way as they view firms in other industries, there has in fact been little research with this kind of market orientation. But colleges and universities clearly do compete in a marketplace, as was recognized many years ago by University of Chicago president Robert Maynard Hutchins, who commented on the emphasis in college advertising on the beauty of campuses and the availability of recreational opportunities (1936, 29). And the issue of competition has, of course, recently taken on added policy importance in light of the Justice Department's investigation into the financial aid practices of several groups of private institutions, noted above. Considered from a global perspective, one of the most unusual features of higher education in the United States is the amount of competition between different institutions. A strong and variegated private sector exists alongside many different public systems. These institutions compete for faculty, students, research grants, contributions, and access to the public purse. Some observers, such as Rosovsky (1990), attribute the vitality of U.S. higher education to its competitive nature. Yet very little work has been done analyzing how competition works in the higher education industry.

White and Rothschild note several puzzles regarding the behavior of U.S. colleges and universities. One is that institutions with small endowments

compete successfully (at least in the sense of survival) with institutions whose per student endowments exceed theirs by a hundredfold and more. This observation raises obvious and interesting questions about the nature of competition in the higher education industry. Other puzzles include the near-uniformity of tuition charges despite clear distinctions in prestige and the apparent resistance to charging revenue-maximizing rates. Questions such as these motivate the Rothschild and White paper, which looks at how individual institutions operate within a larger labor market. One explanation for below-market tuition charges is that it enables institutions to be choosy about what kind of students to accept; where there are externalities among different kinds of students, this may be efficient. The authors also consider the argument that universities use undergraduate education to subsidize research. Using a "stand-alone test," they reject this notion because of the clear fact that universities are able to compete in the market for undergraduate education with colleges that produce only that service. In his comment on the paper, Martin Feldstein suggests that some of the puzzles raised by Rothschild and White can be explained by the set of incentives facing university administrators. Because of the nonprofit nature of these institutions, he argues, there is little to gain and much to suffer from undertaking unpopular but potentially beneficial changes.

At the heart of the economic model of enrollment demand is the assumption that potential college students have a way of assessing the future increase in earnings that would result from attending college. Indeed, one likely explanation for the continued growth in college enrollments during the 1980s, a period in which the number of 18-year-olds was falling, is the strong rebound during the decade in the earnings advantage enjoyed by college graduates over high school graduates. Although this differential fell during the 1970s, it rose smartly after 1979. For example, the gap in average full-time earnings of male high school and college graduates fell from 42 percent in 1970 to 29 percent in 1979 but then jumped back to 50 percent by 1987 (Clotfelter et al. 1991, 65).

How are young people—especially those from lower incomes who know fewer college students and graduates—expected to gather and evaluate information on the economic return to college? This is the beginning point for Charles Manski's chapter. Manski works through a simple model of educational choice to illustrate the difficulty of processing information of this sort. He supposes that youths differ both in their abilities—the extent to which their incomes will increase if they go to school—and in their taste for schooling. He supposes that youths choose to attend college if they believe that college attendance will increase lifetime well-being, including both the effect of college on income and the actual utility (or disutility) of attending college.

Expectations of the effect of college attendance on future income play a key role in this model. Manski considers two alternatives. In each case, youth look to the actual experience of the generation that attended college before them. In one, youth are presumed to have information about the ability of

their elders and thus to know the relationship between ability, education, and income. In the other case, youth do not know the abilities of their elders and assume that all who go to college have the same expected income. The two assumptions about expectations yield two different equilibria; the differences are illuminating. For example, the average ability of the college-bound is higher in the first model than in the second. Manski goes on to consider how an econometrician, ignorant of the actual mechanism used to generate expectations but armed with the conventional faith in rational expectations and the conventional lack of concern for unmeasured variables (in this case, a taste for education)—would analyze the data produced by such models. Not surprisingly, the hypothetical econometrician would fail to grasp the mechanism which generates the returns to schooling and the determination of the decision to enroll in college. Manski concludes that the only way out of this kind of dilemma is to study explicitly the mechanism youth use to form expectations about schooling. He argues that economists must measure and use subjective variables in their studies of the enrollment decisions and returns to schooling. In his comment on this paper, Eric Hanushek expresses skepticism about the likelihood of economists being able to do this and argues that economists using and refining conventional tools can make progress in analyzing the role and effects of expectations. Recent large changes in the apparent returns to education provide a rich opportunity for this kind of analysis.

Despite the overall increase in rates of college enrollment in the United States in recent decades, considerable concern has been expressed about the rates for minority groups. One statistic that has gained attention is the decline in one measure of the college enrollment rate for black and Hispanic high school graduates since the mid-1970s. There is also evidence that college completion rates among blacks have declined markedly from the early 1970s to the mid-1980s. A related trend is a growing gap in enrollment rates between children in families in the top quintile of incomes and other college-age youth. Robert Hauser uses data from the annual Current Population Surveys from 1972 to 1988 to examine trends in college enrollment of young people, with special attention to differences by race and ethnicity. He estimated equations explaining college entry over this period and found that the difference in rates between blacks and whites can be explained by differences in social background. Compared to those of other racial and ethnic groups, white high school graduates come from families that have fewer children, are more likely to own their own house, and have parents who are better educated and have higher status jobs. Holding social background constant, Hauser shows that college entry rates of blacks actually have remained above those of whites. In their comment on this paper, Steven Cameron and James Heckman question some of Hauser's conclusions. They argue that the census data Hauser uses are not sufficiently rich to permit a complete analysis of the determinants of college entry. Their own work (Cameron and Heckman 1992) using a data set which has richer and better information about individual characteristics—in

particular, family income—suggests that differences in college attendance among racial groups cannot be attributed solely to differences in backgrounds.

In their chapter, Philip Cook and Robert Frank focus on another aspect of undergraduate enrollment patterns: where do the best students go? Among the vast number of American undergraduate colleges, an acknowledged few certainly stand out as “elite” institutions. These have contributed far more than their numeric share of leaders in various occupations. Yet the hold these institutions have on the leadership in this country is less than comparable institutions have in some other countries. In Japan, for example, a third of presidents of large companies, over 60 percent of senior government officials, and virtually all postwar prime ministers are graduates of Tokyo University, which produces only about 1 percent of the country’s university graduates (Rohlen 1983, 88, 91; Fallows 1990, 17–18). In the United States, the influence of elite institutions appears to be quite a bit less. Of the eight presidents since 1960, for example, only two, John Kennedy and George Bush, received bachelor’s degrees from elite private institutions.

But is the concentration of talented students in such colleges increasing in this country? Cook and Frank present evidence that it is. They show, for example, that the percentage of a well-known national science competition’s finalists going to Harvard increased between the 1960s and the 1980s from 18 to 22 percent, and the percentage going to one of the top seven colleges increased from 47 to 59 percent. Similarly, the odds that a top-scoring freshman at the University of California will attend the flagship Berkeley campus rose from 2.8 times the odds that any freshman would attend Berkeley in 1980 to 14.7 times the average odds in 1988. If it is indicative of a more general concentration of influence among the set of American colleges and universities, this trend would represent a moving away from a system that offers a relatively large number of independent avenues to positions of power. In his comments, Malcolm Getz questions the definition of *elite* used by Cook and Frank, considers the possibility that the trends they uncover may be part of a very long-term change, and points out that there are still enough elite institutions to ensure some level of choice and competition among them.

Because of their role in determining the quality of academic research and graduate education, undergraduates who choose academic careers are obviously an important input in the economics of higher education. We have a good idea of the numbers of undergraduates who enter graduate programs but lack good information on their quality. Using a unique data set composed of questionnaires completed by virtually all of the graduates of Harvard College from 1985 to 1990, Jerry Green asks whether the quality of college students who intend to become academics has been changing. Overall, he finds little evidence of increased or decreased interest in academic careers during the period, although the data for 1990 may indicate the beginning of a trend toward academic careers. Among humanities majors, however, an increase in interest over the period is evident. Probably the most noticeable change in the

pattern of career choice over this period is a decline in interest in medicine and a corresponding increase in interest in life sciences. In her comment on Green's paper, Charlotte Kuh presents a comparison of the distribution by field of Harvard B.A.'s with the overall distribution and concludes that the Harvard distribution is roughly representative. She draws attention to the decline in the percentage of high honors students selecting doctoral work in the physical sciences as a potentially worrisome trend among the findings presented by Green.

Another element in determining the flow of talented students into Ph.D. programs is the amount of financial support available. The federal government has been a major source of such support, but this source has also been subject to fluctuation. Ehrenberg, Rees, and Brewer examine the effect that changes in federally financed fellowships have had on universities. Looking at the pattern of adjustments made by institutions in reaction to changes in outside funding of graduate fellowships, they find that institutions tend to compensate for such changes by substituting internally financed fellowship support for federal funds. Although such response is quick, it is not one-for-one; on average, institutions decrease their own funding so as to drop about one student for each four additional students supported by outside funds. Examining behavior by field, the authors again find that this general story of internal fungibility applies in most areas. They caution, however, that institutions may redirect or save internal funds in ways that may further mitigate the effects of changes in outside support. In his discussion of the paper, Michael McPherson notes that the subject of this research can be seen as a special case of the more general question of how outside funding affects the behavior of universities. Do they view the funding as temporary and hoard it, or do they view it as permanent and adjust their long-run behavior accordingly? McPherson echoes the authors' conclusion that answering such questions requires a fuller model of the university than we have at present.

In his chapter, Robert Merton focuses on an important topic that has received surprisingly little attention from economists: How should universities manage their endowments? Although only a few universities have endowments ranking them in the billion-dollar club, some 67 universities had endowments as large as \$200 million in 1990, and many more had holdings whose income represents a significant share of their budgets. Merton begins with the standard model of portfolio management. Applying this model to universities requires care because university wealth includes much more than the financial assets in its portfolio. Other major assets include such obvious ones as the institution's land and physical plant as well as less easily measured ones, such as the future stream of expected gifts from alumni and other donors. Because of the variety of this asset mix, the principle of diversification that underlies the theory of optimal portfolio allocation cannot be applied only to financial assets; rather, all assets must be taken into account. Since it is relatively easy to manage, the university's endowment can be used to offset

changes in the larger set of assets. It can be used, for example, as a hedge against anticipated changes in costs. If the local cost of housing affects faculty salaries, an institution can hold local real estate in its portfolio as a hedge against future inflation. This approach may also have implications for the kinds of financial assets a university holds. For example, a technical institution, many of whose alumni work in high-tech industries, should probably invest less of its endowment in those industries, since contributions it receives in the future will most likely be positively correlated with the fortunes of those industries.

In his comment on this paper, George Constantinides raises questions about the basic assumption of Merton's model—that the university should, like a consumer, maximize a discounted sum of future utility. Universities are not, Constantinides notes, individuals. Instead they are more like business firms—economic institutions which exist to serve individual needs. Heterogeneous investors benefit by choosing from the diversified offerings of specialized investment vehicles that are harmed if firms force diversification by forming inefficient conglomerates. In the same way, Constantinides argues, society may be the poorer if some universities diversify as Merton suggests they should. Constantinides' comment also shows how Merton's analysis, which uses the technology of continuous time stochastic processes common to the finance literature, may be recast in more familiar terms.

As noted above, one distinguishing feature of the American system of higher education is the coexistence of strong private and public sectors. The public sector, consisting of institutions operated by state and local governments, is by far the larger, with public institutions enrolling more than two-thirds of all four-year college students and virtually all two-year college students. For state governments, higher education is a major function, accounting for a fifth of all direct expenditures. In the final chapter of the volume, John Quigley and Daniel Rubinfeld examine the provision of public higher education by the states. Historically, they explain, public colleges and universities arose in the shadow of largely preexisting private institutions. In the East, where private colleges were established early, public institutions tend to be less important. By contrast, the public sector is dominant in the newer states of the West and Midwest. One interesting fact consistent with the view that public and private institutions act as close substitutes is the finding that public and private tuitions in a state tend to be positively correlated. Not only does there appear to be a trade-off between states' public and private enrollments, but there is also an apparent trade-off between two-year and four-year colleges. There is substantial variation among states in the amount of public higher education provided and also in the degree to which attendance is subsidized. Perhaps the biggest question concerning the public provision of higher education is why state governments do it at all. Quigley and Rubinfeld provide several alternative explanations, including the possibility that in this country higher education approaches the status of secular religion, receiving