

FOUR QUESTIONS ON THE LABOR ECONOMICS OF HIGHER EDUCATION

Daniel S. Hamermesh, University of Texas at Austin¹

Higher education is an investment. Like any other investment, it involves sacrificing resources now in order to reap returns in the future. It is crucially different from all other investments in only one respect: It is embodied in a worker. A piece of machinery can be sold by the company that made the initial investment; and if the company goes bankrupt, its capital goods have some resale value. **Human capital** can only be “rented” to employers or to customers, not sold; and death, the personal equivalent of a firm’s dissolution, completely vitiates the value of the decedent’s human capital. Other differences between human capital and physical capital (equipment and structures) are not really matters of kind. As such, many of the considerations about decisions to invest in physical capital apply to discussions about investment in human capital.

While I concentrate on investment in higher education (limited here to post-secondary, excluding post-graduate education), much of the discussion also applies to policy at other levels of education. I outline a set of questions that seem central to policy on higher education and try to bring evidence from labor markets to bear on them.

I. How Much Higher Education Should There Be?

A business judges the worth of a prospective investment by analyzing its likely **rate of return**—the equivalent to measuring the annualized gain on a dollar spent on the investment today. A higher rate of return means the investment is more worthwhile. Whether it is

¹Edward Everett Hale Centennial Professor of Economics; Research Associate, National Bureau of Economic Research; and Program Director, Forschungsinstitut zur Zukunft der Arbeit (IZA).

sufficiently worthwhile to merit undertaking depends on how risky it is and on the returns on other potential investments.

The average cost to society of an investment in an additional year of higher education is the sum of all resources devoted to that year—instructional time, the annuitized value of equipment and structures, books and materials, and the **opportunity cost** of the time of the students who are spending that year being instructed—the value of their time if they were not attending school (perhaps what they could earn as full-time workers). The average cost to the student is different—it includes the opportunity cost of the student’s time and his/her tuition less any direct financial aid less any subsidies on student loans. Even if the student receives no aid and takes out no subsidized loans, s/he faces a cost that is typically less than the total economic cost of the education.

Immense effort has been devoted to measuring the rate of return to schooling in the U.S. and other countries. I did some estimates for the years 1979 and 2004 using large random samples of American workers and adjusting for differences in age, hours worked, race and sex. The evidence indicates that in 1979 a year of schooling generated a rate of return of 5.6 percent (after accounting for price inflation), while in 2004 it yielded a return of 9.1 percent (after accounting for price inflation). This latter estimate is consistent with what is generally found in the literature—a recent survey of nearly 100 estimates in 9 countries (Ashenfelter *et al*, 1999) found an average return of 8 percent. The rise over the past quarter-century is also consistent with the frequent observation that the rate of return to (college) education has increased. Additional estimates suggest that today the average return to an additional year of tertiary education is at least 10 percent.

There are intense debates about whether these estimates are correct. Admittedly they do not answer the question of what would happen if the same person could experimentally be given a “dose” of college and his/her eventual earnings compared to what would have been earned without that treatment. Studies that try to account for innate differences between college graduates and others, for example, by focusing on identical twins, generate estimates that are

somewhat higher than those cited above (Ashenfelter *et al*, 1999). It seems fair to say that a year of college today yields the graduate at least a 9 percent rate of return after inflation.

Is this a high or low return? At today's inflation rate it is equivalent to having funds in a savings account that pays 12 percent. That seems extraordinarily high; but a savings account is a much less risky investment than a college education: The latter might pay off hugely, but it might also be worthless if the graduate is killed immediately after receiving a diploma or, less starkly, turns out to be a "loser" in the labor market. We cannot really say what the appropriate return should be; but if an investment in college has not become more risky over the past quarter-century, which seems like a reasonable assumption, we can conclude that higher education is a more worthwhile investment today than it was in the 1970s.

A new machine produces goods that otherwise would not have been produced. While an additional year of college substantially raises a person's earnings, does it increase national output—does it increase his/her productivity? Does college instead merely channel certain people, who are able, either because of intelligence, parental resources, or their own patience, to attend college and thus distinguish themselves from others, into jobs that would otherwise pay more (Spence, 1973)? There is no good answer to this question in the economics literature, although the issue has been heavily studied. Suffice it to say: 1) Otherwise identical (measured by family background and ability) students from colleges with higher-skilled faculty wind up earning more (Wise, 1975); 2) Otherwise identical students who obtain higher grades at the same institution and in the same major earn more (Wise, 1975); and 3) Otherwise identical students at the same institution earn more if the major is more rigorous and if they have taken more upper-division science and math courses (Hamermesh and Donald, 2003).

In sum, the evidence suggests no direct answer to the titular question of this Section. It does indicate, however, that whatever the "right" amount of college education was in the 1970s, today it is at least as great. Moreover, that "right" amount arises at least in part because college education raises people's productivity in the workplace; it does not merely sort workers among

jobs that could have been filled by non-college graduates with no attendant loss in national productivity.

II. What Kind of Higher Education—General vs. “Vocational”?

Much of the time that students spend in college is in general education or in courses that are unlikely to contribute directly to their productivity in their subsequent careers. Other courses, e.g., learning option pricing in a finance class, are of a more “vocational” nature. There is no “right” or “wrong” mix of such courses. Although there are constant cries for a more “relevant” higher education, no doubt arising in part from companies’ desires to have the public pay for training that they would otherwise have to provide, it is not at all clear what is relevant if we look beyond the very short-run applicability of knowledge in the marketplace.

General course work should not be viewed as unproductive in the marketplace, as it can increase students’ mental flexibility and demonstrate to potential employers that the student can deal with new situations. We know from substantial evidence from the past 15 years (Berman *et al.*, 1998) that technology and skill are complementary—there is a greater demand for generally skilled workers in those companies and industries where technology is changing more rapidly. Generalized skills enable workers to develop and implement new technology more quickly. **Technology-skill complementarity** is the best narrow economic argument for higher education to be at least partly non-vocational. One might rationalize vocational courses as contributing to **capital-skill complementarity**—enhanced productivity of the existing capital stock when it is used by more skilled workers (Hamermesh, 1993). The less rapidly changing is technology, the more important is capital-skill complementarity and presumably too the vocational course work that might enhance it.

These considerations suggest that, if we believe the economy will be fairly static, concentrating on more vocationally-oriented curricula makes more sense than if we believe the economy will be advancing more rapidly through technology. While true, this ignores the

likelihood that technological change does not just happen: To some extent it is the result of new ideas that are stimulated by the kinds of training and education that people obtain in college and post-graduate work. Which curricula are more likely to stimulate technological advances is unclear; but it is clear that a concentration solely on vocationally-related education will narrow the channels along which new technology might be developed and in the end retard economic growth.

III. What are the Disincentive Effects of Prices on College Attendance and Completion?

While parents and students complain about gross tuition and fees (before any financial aid is offered), the evidence suggests that a substantial amount of these charges is offset by financial aid (nearly 40 percent in private higher education in the form of aid from the private colleges themselves, Ehrenberg, 2006, and an even greater percentage when we add in Pell grants, state aid, subsidized loans, tax credits, etc.). This wedge between the gross and net prices is may be as large in percentage terms, and although surely smaller in dollar terms, in public higher education. One would quickly come to the conclusion that any discounts in the form of financial aid and subsidized loans would so greatly reduce the price of attendance as to induce huge increases in the demand for higher education. Obversely, one might conclude that reducing public support for higher education and replacing it with tuition vouchers would make access to higher education at least as easy as it is now.

Such thinking ignores the essential nature of the costs of obtaining higher education. At all but the elite private institutions the opportunity cost of attendance—foregoing a full-time job and the earnings it offers in order to attend college—accounts for the majority of the true cost facing a student. Calculations for 2004 on a large random sample of Americans ages 18-24 show that those who had graduated from high school but not college and were enrolled full-time in school earned over \$10,000 less than high-school graduates who were not enrolled at all and who worked full-time. The \$10,000 difference, the opportunity cost of a year of college, makes up the

majority of the cost that students face even if they receive no financial aid and no subsidies on student loans.

Given this cost, it is not surprising that the evidence suggests that subsidizing tuition generates only slight increases in the demand for higher education (increased enrollments and lower drop-out rates). In economists' jargon, the **elasticity of demand** appears to be low—and the reason is that even a substantial cut in net tuition and fees represents a cut in the total cost of college that is less than half as big as it appears (because it does not alter the opportunity cost of attendance).

While there have been many studies of the effect of tuition on college enrollments over the past four decades, early studies (e.g., Hight, 1975) had difficulty sorting out issues of causation between enrollment rates and tuition levels. A large series of what were essentially natural experiments in the 1990s—merit-based aid such as Georgia's Project Hope—offered evaluators the chance to infer how enrollment and completion rates respond to externally imposed changes in the cost of attending college. We have now accumulated a lot of evidence on these effects, and the evidence is clear: Offering such aid does matter—reducing the net price of attending college does increase attendance and does enhance completion compared to what would be observed for otherwise identical students (Dynarski, 2005); but the effects are not large. The best estimate is that a program that reduces the net tuition cost nearly to zero increases the share of the population receiving a college degree by about 3 percent (from around 25 percent in the states that were studied). This is important and suggests some responsiveness; but it underscores the point that even a generous grant program (and most do not even cover all of tuition/fees) cannot reduce the price of attending college by enough to generate large increases in enrollment. In short, offering further subsidies to college attendance, or cutting back on existing subsidies, is unlikely to alter greatly the average number of students attending and completing higher education.

If cutting or raising public subsidies will not greatly change enrollment and completion rates, why should we worry about whether the U.S. accelerates the rate of privatization of public

higher education? Although the effects are not huge, there is little doubt that access to college affects enrollment. For example, one study (Card, 1995) showed that having a college or university near one's home substantially affects one's probability of enrollment. Moreover, the evidence on merit-based scholarships (Dynarski, 2005) makes it clear that these costs disproportionately affect access by students who come from poorer families. While cutting public subsidies would not matter hugely in terms of total enrollment, it would especially deter potential students from lower-income families. The choice of greater privatization of higher education is thus an implicit choice in favor of diminishing access to higher education to students whose families are not in the upper part of the income distribution. Given evidence on the phenomenal increase in earnings inequality in the upper half of the U.S. earnings distribution over the past 20 years (Autor *et al*, 2005) and on low intergenerational income mobility in the U.S. compared to many other industrialized countries (Solon, 2002), any policy that especially reduces access to college for children from families in the bottom two-thirds of the income distribution will exacerbate the already strong trends toward greater income inequality, both within and across generations.

IV. How to Fund Higher Education: Public vs. Private?

As the discussion of Question I demonstrated, those who attend and complete college reap tremendous **private** benefits in the form of a very substantial and, in the past quarter century, rising return on the costs they incurred. The high rate of return justifies charging students and their families high tuition and other fees for higher education. The question is whether there is any justification for subsidizing higher education by having the public—the taxpayer—pay part of the costs.

One justification, albeit one that is extremely difficult to demonstrate empirically, is that higher education generates **positive externalities**—benefits that spill over beyond the educated young adults and that the students do not and cannot obtain. Foremost among these must be the

benefits from research, both basic (the locus for which is now mostly universities) and applied. For example, most Nobel prizes awarded to Americans have been for research performed in university settings. This observation does not prove there is a relationship between the provision of education and the production of research results—one could imagine higher-education proceeding on a two-part basis, with instruction by teachers and research by non-teachers located outside universities; but in the last century they have gone together in the U.S.

While appealing to our notion of having users pay for what they obtain, separating research and teaching ignores their **complementarity**: Every leading researcher can cite examples of his/her own research projects that have been stimulated, informed and occasionally even germinated as a result of instructional activities, even those in lower-division undergraduate courses; and every teacher who is active in research can cite examples where s/he taught better because of his/her current research that helped inform a lecture or discussion. Being actively involved in research makes one a better instructor; and instructing students makes one a better researcher. These complementarities make research and instruction **joint products** and justify their joint funding because they are produced more efficiently when produced together. Separating funding for them would result in less output of each for the same amount of spending.

A second argument for public funding also rests on positive externalities, but in the labor market itself. There is very convincing recent evidence (Moretti, 2004) that, in cities with a greater proportion of more highly educated people, those workers with less education are more productive, and earn more, than they would elsewhere. Educated workers manage and perform better—and they increase the output generated by their less-educated peers.

The third argument for public funding is purely distributional—public higher education is a mechanism by which the increasing tilt of the labor market toward higher-earners can be reduced in the context of lifetime incomes. Since college attendance is tilted toward students from families above the median income, and since most public subsidies are from state taxes that are at most only mildly progressive, the current system of public higher education may on net be regressive—it may be redistributing income from the middle- to somewhat above middle-income

families (Hanushek *et al*, 2004) Ignoring any issues of access and incentives (see Question III), any restructuring of the system that would tilt more of the burden toward upper-middle and upper-income families and reduce the burden on middle- and low-income families would help mitigate the trends toward increasing earnings and income inequality and intergenerational immobility. Given the apparent unwillingness of states to increase the progressivity of their tax structures, reforms that increase the nominal costs of college education while offering much larger packages of financial aid to lower- and middle-income students, thus reducing net costs to them, would allow public higher education to return to its post-World War II function as an equalizer of opportunity.

Would a voucher system be sufficient to provide the kind of aid to public institutions that would match or even exceed current aid? That is possible; but it is more likely that, as in Colorado, voucher programs would be open to private institutions as well as public; unless total state aid were to increase, the siphoning off of resources by private schools would reduce subsidies to public higher education. The net effect would be a reduction of opportunity for children from families below the upper part of the income distribution, and an exacerbation of the past quarter century's trends toward increased inequality.

In light of all the concerns discussed in answering these four questions, can anything be done to increase access, especially for students from lower-income families, and simultaneously avoid increasing public expenditure? Assuming that the latter is a goal—that one believes that the difference between the social and private returns to education is not huge—no extension of any current U.S. policy in higher education would seem to meet all these criteria. Ideas that have been implemented elsewhere, however, might be worth considering. In 1989 Australia adopted its Higher Education Contribution Scheme (HECS), an income-contingent loan repayment system. The idea, apparently first proposed by Milton Friedman (1955), imposed substantial tuition/fees that were waived subject to their being repaid through additional future tax payments that depended on the student's subsequent earnings. Thus two students facing the same tuition will differ in the amount they repay, with higher-earners paying more. Of course, the future

payments would be inflated appropriately to account for cost increases and for the foregone interest.

The evidence on this program (Chapman, 1997, 2005) suggests that it substantially increased enrollment and did so particularly among students below the upper tail of the income distribution. It indicates that there are ways of expanding enrollment and enhancing access, but that they require thinking beyond the usual “solutions” of aid and privatization.

V. Not a Question, but an Observation

In the private sector a successful business expands those of its product lines that are generating profits and contracts those that generate losses. One might make an analogy to the public sector: Those public activities that meet the test of a market ought to be the ones that are expanded, not contracted. Public higher education in the United States clearly meets that market test: 1) Surveys of university rankings place U.S. schools disproportionately at the top of rankings covering the entire world; and that is true both for privates and for publics (Times Higher Education Supplement, 2004); 2) U.S. post-graduate education in nearly all fields is recognized as the best on the planet; 3) At least partly because of these facts, many more foreign students, attracted by the high quality of U.S. higher education, come here than U.S. students obtain their tertiary education abroad; and 4) This net intellectual trade surplus has, perhaps more than any other factor, enabled this country to seed the world with its ideals, as students return to their home countries having imbibed American ideals and American culture. Given this history of success, any proposal that could result in a diminution of the quality and breadth of the U.S. system of higher education must, if it is to be taken seriously, demonstrate how it is distinguishable in concept from a private corporation’s cutting back its profit-making activities.

REFERENCES

- Orley Ashenfelter, Colm Harmon and Hessel Oosterbeek, "A Review of Estimates of the Schooling/Earnings Relationship, with Tests for Publication Bias," *Labour Economics* (Nov. 1999): 453-470.
- David Autor, Lawrence Katz and Melissa Kearney, "Rising Wage Inequality: The Role of Composition and Prices," National Bureau of Economic Research, Working Paper No. 11628, Sept. 2005.
- Eli Berman, John Bound and Stephen Machin, "Implications of Skill-Biased Technical Change: International Evidence," *Quarterly Journal of Economics* (Nov. 1998): 1245-1279.
- David Card, "Using Geographic Variation in College Proximity to Estimate the Return to Schooling," in Louis Christofides, Kenneth Grant and Robert Swidinsky, eds., *Aspects of Labour Market Behavior*. Toronto: University of Toronto Press, 1995.
- Bruce Chapman, "Conceptual Issues and the Australian Experience with Income Contingent Charges for Higher Education," *Economic Journal* (May 1997): 738-751.
- , "A Detailed Case Study of a Risk-Sharing Income Contingent Loan: Australia, 1989 to 2004," unpublished manuscript, Australian National University, 2005.
- Sue Dynarski, "Building the Stock of College-Educated Labor," National Bureau of Economic Research, Working Paper No. 11064, Sept. 2005.
- Ronald Ehrenberg, "The Perfect Storm and the Privatization of Public Higher Education," *Change*, January/February 2006.
- Milton Friedman, "The Role of Government in Education," in Robert Solo, ed., *Economics and the Public Interest*. New Brunswick, NJ: Rutgers University Press, 1955.
- Daniel Hamermesh, *Labor Demand*. Princeton, NJ: Princeton University Press, 1993.
- and Stephen Donald, "The Effect of College Curriculum on Earnings: Accounting for Non-Ignorable Non-Response Bias," National Bureau of Economic Research, Working Paper No. 10809, Oct. 2004.
- Eric Hanushek, Charles Leung and Kuzey Yilmaz, "Borrowing Constraints, College Aid, and Intergenerational Mobility," National Bureau of Economic Research, Working Paper No. 10711, Aug. 2004
- Joseph Hight, "The Demand for Higher Education in the U.S.: Public and Private Institutions, 1927-1972," *Journal of Human Resources* (1975): 512-520.
- Enrico Moretti, "Estimating the Social Return to Higher Education: Evidence from Longitudinal and Repeated Cross-Section Data," *Journal of Econometrics* (July/August 2004): 175-212.
- Gary Solon, "Cross-Country Differences in Intergenerational Earnings Mobility," *Journal of Economic Perspectives* (Summer 2002): 59-66.

A. Michael Spence, "Job Market Signaling," *Quarterly Journal of Economics* (Aug. 1973): 355-374.

Times Higher Education Supplement, "World University Rankings, 2004," Nov. 5, 2004.

David Wise, "Personal Attributes, Job Performance and Probability of Promotion," *Econometrica* (Sep. 1975): 913-932.