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CHAPTER V

Underinvestment in College Education?

THIS chapter adds several dimensions to the evaluation of the effects of college education on earnings and productivity by comparing private and social gains from college education with those from other investments. These comparisons permit a determination of how much is gained or lost by individuals and society from investing in the former rather than the latter, and are essential to determine whether there is underinvestment in college education; they also help determine whether the capital market difficulties, the lack of knowledge and liquidity, etc., outlined in Chapter III (see section 2) have been serious impediments to the flow of resources into college education.

1. Private Money Gains

In discussing whether the private gain from college exceeds that on other investments, a distinction must be made between the typical college graduate and the typical high-school graduate. Chapter IV indicated that the former gains more from college than the latter would, that he comes from a much higher socioeconomic background (see Table 4), and that he very likely finances his education with resources that would otherwise (in part at least) have been invested elsewhere, while the latter often would have to borrow, live frugally as a student, or work overtime (after school). For the sake of brevity, the discussion is limited to white male graduates, although interesting comparisons could be made with drop-outs, nonwhites, and women.

The private rate of return after adjusting for differential "ability" seems to be more than 12 per cent to the cohort of white male college graduates. When comparing the rate on college with rates that would

have been obtained if the resources spent on college had been invested elsewhere, there has been a rather surprising tendency to select rates on liquid investments bearing little risk, such as government bonds or savings accounts.[1] The discussion has just indicated (Chapter IV, section 4), however, that an investment in college education is subject to considerable risk, and is obviously extremely illiquid. Consequently, the gain from education should be compared with that on investments with equally large risk and illiquidity.

The earlier analysis indicated that the variation in the rate of return from corporate manufacturing investments is of the same general order of magnitude as that from college education. Stigler estimated the average rate of return on the former at a little over 7 per cent,[2] several percentage points higher than that on riskless assets, but still much lower than the 12+ per cent received by white male college graduates. Although this difference of some 5 percentage points might be explained by compensating differences in liquidity and taxation,[3] a more reasonable inference would be that the private money gain from college to the typical white male graduate is greater than what could have been obtained by investing elsewhere.

An estimate of the money gain could be found by discounting the adjusted income differentials between college and high-school graduates at a rate measuring alternative opportunities. If the 4 per cent riskless rate were used, the present value[4] of the gain to the 1949 cohort of white males would be more than $30,000; the more appropriate rate of 6 per cent would cut the gain to under $20,000, and the possibly still more appropriate rate of 10 per cent would cut it to under $4,000. Although all these estimates are very much under the

[1] See P. C. Glick and H. P. Miller, "Educational Level and Potential Income," *American Sociological Review,* June 1956, p. 310; and J. Morgan and M. H. David, "Education and Income," *Quarterly Journal of Economics,* August 1963, p. 435.

[2] G. J. Stigler, *Capital and Rates of Return in Manufacturing Industries,* Princeton for NBER, 1963, Table 10.

For each year from 1938-57, a rate of return was defined for all corporate manufacturing firms as the ratio of after-tax profits to total capital. The simple average of these ratios equals about 7 per cent both during 1938-47 and 1947-57.

[3] Investors in firms could sometimes avoid the high personal income tax by converting ordinary income into capital gains; investors in education cannot. The fact that depreciation on physical capital can be explicitly deducted from taxable income while that on education cannot, at first glance, also seems to favor investment in firms. A closer look, however, raises some serious doubts (see Chapter II, section 1, and Chapter VII, section 2).

[4] By "present value" is meant the value at the time of entrance into college.

$100,000 figure often bandied about,[5] they are not insignificant. For example, even if the gain were "only" $3,500 (a 10 per cent rate), average tuition and fees in 1949 could have been raised by more than 300 per cent without wiping it out.[6]

The typical high-school graduate is another story. Instead of more than 12 per cent, he would receive 10-11 per cent if he went to college. Moreover, instead of investing resources that could have been invested elsewhere he would have to finance much of his college education by borrowing from friends or relatives,[7] by living frugally, or by working after school and during vacations. Since households regularly pay from 8 to 18 per cent on bank and instalment credit loans and even more on others, the cost of borrowing and/or the preference for present consumption must be considered substantial. Consequently, even an 11 per cent rate of return from college would not bulk very large, especially when it is recognized that liquidity considerations would be important here because these persons presumably have a limited command of liquid assets.[8]

So while a college education seems to yield a net money gain to the typical white male college graduate, it may not to the typical white male high-school graduate. One should note, however, that the rapid growth in recent years of low-interest student loans subsidized by state and federal governments[9] certainly must increase the attractiveness of a college education. A study of the demand for these loans should shed considerable light on the conclusions reached here, and

5 Derived by Glick and Miller, *American Sociological Review,* June 1956. For a critical comment on their estimate, see H. O. Houthakker, "Education and Income," *Review of Economics and Statistics,* February 1959, pp. 27-28.

6 Tuition and fees are estimated at $230 per student per year in 1949 (see Appendix A, section 2b). They could have been raised to over $1,000 without wiping out the gain.

7 Or in recent years from governments. See later discussion.

8 Thus, according to one study, lack of money is the major reason given for not going to college by high-school seniors from lower-income families, while it is a relatively minor reason given by seniors from higher-income families (see *Educational Status, College Plans, and Occupational Status of Farm and Nonfarm Youths: October 1959,* U.S. Bureau of Census, Series ERS (P-27), No. 30, Washington, 1961, Table D).

9 As of September 1963, New York State alone had more than $72 million outstanding in loans (see *The New York Times,* Sept. 22, 1963). By mid-1960 the National Defense Student Loan Fund amounted to almost $80 million (see A. Rivlin, *The Role of the Federal Government in Financing Higher Education,* Washington, 1961, p. 77).

especially on the capital market impediments to investment in college education.[10]

2. *Social Productivity Gains*

The social economic gain from education, the gain to society as opposed to individuals, could differ from the private gain because of differences between social and private costs and returns. Economists (and others) have generally had little success in estimating the social effects of different investments, and, unfortunately, education is no exception. One can, however, develop some lower and upper limits that effectively rule out many of the more fanciful assertions about the effects of education.

Total social as well as private costs would be the sum of direct and indirect costs. Direct costs are clearly greater to society than to students because some of the expenditures on students are paid out of public and private subsidies. Obviously, "free" state and municipal colleges use scarce resources and are not free to society. Indirect costs, on the other hand, would be greater to society only if the output of students foregone by society exceeded the earnings foregone by students, which is not so obviously true.

Direct social costs would be the sum of educational expenditures by colleges and the social cost of books and additional living expenses. While the latter can be approximated by their private cost, an estimate of educational expenditures is not obtained as easily since colleges spend money on athletic competitions, room and board, adult education, research, medical care, etc., as well as on education proper. In other words, they are multiproduct "firms" with a total expenditure much greater than that on the single product education. I have tried to approximate educational expenditures by eliminating expenditures on "noneducational activities," extension services, research, and "specialized instruction" from the total.[11]

Although social costs should obviously include capital as well as current costs, the fraction of educational expenditures paid by fees

10 Although bearing low-interest rates, these loans are not "easy" in all respects; in particular, they usually require repayment within a much shorter period of time than it takes to collect the pay-off from a college education (on the pay-off period, see section 4 of Chapter IV).

11 For definitions of these terms, see "Statistics of Higher Education, 1955-56," *Biennial Survey of Education in the United States, 1954-1956,* Washington, 1959, Chapter 4, Section II, pp. 58-80. For a further discussion, see Appendix A, section 2c.

has usually been overestimated because only current expenditures have been considered. Since educational institutions are quite capital intensive, expenditures are substantially raised and the fraction attributed to fees lowered when physical capital is included. For example, in 1950 the use value of capital in colleges was about 26 per cent of current expenditures, so that although fees were 42 per cent of current expenditures, they were only about 33 per cent of all expenditures. The full private contribution to all social costs has, however, been greatly underestimated because indirect costs are generally ignored, and they are mostly a private cost. If, for example, foregone earnings were used to represent indirect social costs, college students would be paying through tuition, fees, and foregone earnings almost three-quarters of all social costs.

Social and private economic returns from college would differ if a college education had different effects on earnings and productivity. A student generally needs only determine the effect of a college education on his earnings, but society needs to determine its effect on national income. Thus if college graduates earn more partly because their productivity was systematically overestimated, private returns would tend to be larger than social ones. A more common criticism, however, is that earnings greatly understate the social productivity of college graduates (and other educated persons) because they are (allegedly) only partly compensated for their effect on the development and spread of economic knowledge. In technical language, social returns are said to be larger than private returns because of the external economies produced by college graduates.

As a first approximation, social returns will be measured by the before-tax earnings differentials, tax payments being one kind of external economy, and indirect social costs will be measured by the before-tax earnings foregone. The social rate of return, unadjusted for differential ability, would then be about 13 per cent to the 1939 cohort of urban, native-white, male college graduates and 12.5 per cent to the 1949 cohort of white male college graduates. These are only slightly less than the private rates because differential tax payments almost offset the subsidies to college education. Similar results would be found for drop-outs and for nonwhite, female, and rural college graduates.[12] Adjustments for I.Q., grades, and other ability

[12] For example, social rates of return to the 1939 cohorts of urban native-white, male drop-outs and urban, southern, nonwhite, male graduates are estimated at 8.5 and 11 per cent, respectively, compared with private rates of 9 and 11.9 per cent.

factors would have about the same effect on the social rates as they did on the private rates: relatively little for the typical college person, and a few percentage points for the typical high-school graduate (if he had gone to college).

The development of a more sophisticated estimate of the social gain is not easy because other external effects are very difficult to measure. The absence of any direct measurements forced me to use an indirect and not very reliable method. E. Denison has recently estimated the contribution of physical capital, labor, increasing returns, and many other factors to economic growth in the United States. After deducting these contributions, a residual is left over that he calls the contribution of "advancement in knowledge."[13] By attributing all of the residual to education,[14] an upper limit to the social effect of education can be developed.[15]

According to Denison, about .58 percentage points of the 1.60 per cent average annual growth from 1929 to 1957 in national income per person employed is explained by the growth in knowledge,[16] and about .67 percentage points by the growth in education.[17] If the growth in knowledge was considered an indirect effect of the growth in education, the share attributed to education would almost double. This in turn implies that the estimated average rate of return on education would also almost double.[18]

[13] See his *Sources of Economic Growth in the United States,* New York, 1962.

[14] S. G. Strumilin, in an interpretation of economic growth in the Soviet Union, does consider the "residual" to be a "social" effect of education (see his "The Economics of Education in the U.S.S.R.," *International Social Science Journal,* 1962, No. 4, p. 642).

[15] Although a likely upper limit, it is not a necessary one because larger external economies from education might have been nullified by net external diseconomies from other sources.

[16] *Sources of Economic Growth,* Table 33. The amount (residual) attributed to knowledge would be different if different assumptions had been made about the importance of economies of scale, restrictions against the optimal use of resources, etc. For example, if all the increase in output per unit of input resulted from advances in knowledge, the contribution of such advances would rise to .93 percentage points.

[17] *Ibid.* The contribution of education is based on before-tax earning differentials liberally adjusted for ability (*ibid.,* Chap. 7).

[18] The increase in income attributable to an increase in education can be written as: $y = k\frac{C}{Y} = kI$, where y is the percentage increase in income, k is the effect on income of investing a dollar in education, and I is the fraction of income invested in education. If the effect of a given investment in education were to double, y and thus k would double. But since $r \equiv k$, where r is the rate of return, a doubling of k would approximately double r.

If the contribution of different educational levels to the advance in knowledge were proportionate to their direct effects on earnings—possibly college graduates had a disproportionately large contribution—the unadjusted social rate of return to white male graduates would be estimated at close to 25 per cent. The initial estimate of the social rate, 13 per cent, and the 25 per cent provide a lower and an admittedly rough upper limit to the true rate, the difference between them measuring the ignorance of external effects. Although this difference is embarrassingly large, it does suggest that, contrary to many assertions, the private economic gain from education is much of the social economic gain. For the private gain is more than half of the apparent upper limit, and presumably a good deal more than half of the true social rate.

In recent years the federal government has been subsidizing investment in education through scholarships and loans,[19] and investment in business capital through accelerated depreciation, tax credits, and other means. Somehow the limited funds available must be allocated between these different kinds of investment. One determinant clearly should be, and hopefully is, their relative contribution to national income, a topic which will now be discussed briefly.

A first approximation to the social rate of return on business capital can be found by relating profits to capital, with profits including the corporate income and other direct taxes.[20] The before-tax rate of return on corporate manufacturing capital averaged about 12 per cent for both 1938-47 and 1947-57,[21] compared to an after-tax rate of 7 per cent. If the before-tax rate on all corporations were between 10 and 13 per cent and that on unincorporated firms between 4 and 8 per cent, almost the same as the after-tax rate on corporations, the rate on all business capital would be between 8 and 12 per cent.[22] The first approximation to the social rate of return to white male college graduates would be between 10 and 13 per cent after adjustment for differential ability. Since the rates to drop-outs, women, and nonwhites would be a few percentage points lower, the rate to all

19 See Rivlin, *Role of Federal Government,* Chapters 4-5.

20 This method assumes only that direct taxes come *initially* out of the return on capital; it is consistent with any kind of *ultimate* incidence.

21 Computed by adding the tax payments of corporate manufacturing firms to Stigler's after-tax profits.

22 About 80 per cent of all tangible business capital seems to be in corporations (computed from Vol. II of *Studies in the National Balance Sheet of the United States* by R. Goldsmith, R. Lipsey, and M. Mendelson, Princeton for NBER, 1963).

college entrants would be between 8 and 11 per cent. The rates on business capital and college education seem, therefore, to fall within the same range.

A fuller treatment of external effects could, however, change the picture entirely. It has been seen that if all the unexplained residual for 1929-57 were attributed to education, its estimated social rate would almost double; if, on the other hand, all was attributed to business capital, its estimated social rate would much more than double.[23] Consequently, depending on the allocation of the residual, i.e., the "advance in knowledge," the estimated social rate on college education could be as much as twice and as little as less than half of that on business capital. Ignorance about the "residual," therefore, precludes at present any firm judgment about the relative social rates on business capital and college education.

3. Private Real Rates

A treatment of the full, as opposed to the economic, social rate of return on college education would involve a consideration of cultural advance, democratic government, etc., and is clearly far beyond the scope of this study. Even a treatment of the full private rate is exceedingly difficult and I shall be content simply to raise some questions and suggest a few very tentative answers.

In deciding whether to go to college, attitudes toward college life and studying, the kind of work college graduates do, and other psychic factors are relevant as well as the gain in earnings. Full or real returns and costs would be the sum of monetary and psychic ones, and the real gain would depend on the relation between these real returns and costs. The psychic gain from college, like the monetary gain, probably differs considerably between the typical college and high-school graduate. For presumably the former does and the latter does not go to college partly because of a difference in expected psychic gains.[24] Or to use more direct evidence, lack of interest is usually a major reason cited by high-school seniors in explaining why they were

23 The effect on the business rate is much greater than that on education because the estimated direct contribution of business capital to growth is much less than that of education (see Denison, *Sources of Economic Growth,* Table 33).

24 For a similar argument applied to monetary gains, see section 2 of Chapter IV.

not going to college, and by college drop-outs in explaining why they never finished.[25]

Quantitative estimates of psychic gains are never directly available and are usually computed residually as the difference between independent estimates of monetary and real gains.[26] Unfortunately, independent estimates of the real gains to college graduates are not available. For example, they could not be measured by the monetary gains from other capital because there may also be psychic gains from such capital,[27] and, more importantly, because the real gains from college and other capital may differ owing to differences in access to the capital market or to other factors. One can use actual behavior to test whether real gains do differ. For if, say, college education were an unusually attractive investment, pressure would develop to invest more there, and while it could be offset in the short run by financing and other difficulties, these could be at least partially surmounted in the long run.

Table 11 indicates that the gross investment in college education rose from about 2.5 per cent of that in physical capital in 1920 to

TABLE 11

INVESTMENT IN COLLEGE EDUCATION RELATIVE TO PHYSICAL CAPITAL FOR SELECTED YEARS

	Ratio of Investment in College to Gross Physical Investment	Ratio of Foregone Earnings to Gross Physical Investment
1920	.026	.016
1930	.076	.037
1940	.082	.040
1950	.103	.062
1956	.121	.071

Source: The numerators from T. W. Schultz "Capital Formation by Education," Journal of Political Economy, December 1960, Table 6; the denominators from Simon Kuznets, Capital in the American Economy: Its Formation and Financing, Princeton for NBER, 1961, Table R-4, p. 490.

25 See *Educational Status, College Plans, and Occupational Status of Farm and Nonfarm Youths: October 1959*, Tables D, and 12-16; also E. Roper, *Factors Affecting the Admission of High School Seniors to College*, Washington, 1949.

26 See, for example, the estimates of "tastes for discrimination" in my *Economics of Discrimination*, Chapters 7-8.

27 For example, Marshall alleged that much of the value of land in Great Britain resulted from the prestige attached to ownership (see his unpublished lecture, "Progress and Poverty," delivered March 6, 1883, and recently mimeographed by G. J. Stigler).

about 8 per cent in 1940 to 12 per cent in 1956. Foregone earnings, which are a rough measure of private investment, rose no less rapidly.[28] So the private real rate of return has apparently been higher on college education than on physical capital. Since the money rate has probably also been higher (see section 1), the evidence on real rates does not necessarily mean that the psychic rate has been higher on college education than on physical capital, but only that it could not have been much lower.

28 Of course gross investment in education may have risen faster because the cost rather than the quantity of education rose faster. Unfortunately, no one has developed a good measure of the quantity of education; the most reasonable available measure is the number of persons receiving a college education. Since 1940 the number of college graduates in the labor force has much more than doubled while the real value of the capital stock has increased by less than 70 per cent (see my Table 15 and Denison, Table 12).