

The Rates of Return on Investment in Education in Michigan

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Introduction

Guided by the philosophy of New Frontiers and the Great Society, there was a massive infusion of state funds into higher education during the 1960's. This investment resulted in a sharp increase in the number of students and state-supported academic institutions. High school graduates were encouraged to seek a college education. A university degree came to be regarded as a passport to secure employment.

Due to the stagnant economy and stagflation during the decade of the 1970's, new employment opportunities could not keep up with the supply of college graduates. At the same time, due to relatively high rates of unemployment, there was an erosion of the tax base and, hence, the inability of states to meet their expenditures. This necessitated cuts in a number of state programs, including higher education budgets. Faced with rising costs due to inflation and declining support from state governments, the universities and colleges across the nation began to raise their tuition fees.

The State of Michigan experienced one of the highest rates of unemployment in the nation during this period. Hence, the tax base shrank and state support could not keep up with the rising costs of education. Tuition fees rose to close the gap. Currently, Michigan has three major universities that rank first, third, and fourth in terms of cost for state universities in the nation [*College Cost Book*, 1984; *Detroit Free Press*, 1984].

It has been shown that the private rates of return to education are normally higher than the social rates because the present value of the extra taxes students pay over their lives does not make up for the difference between private and social costs [Blaug, 1976(b), p.

277, 1972, pp. 176-77]. The hypothesis of this paper is that as the cost of higher education rises and inflation pushes individuals into higher tax brackets, the social rates of return to higher education will exceed the private rates.

One important issue in human capital theory is the question of family background and its influence on earnings. Kiker and Condon [1981] show that socioeconomic background significantly influences earnings, but the influence is sensitive to variables chosen. Another study [Carroll and Ihnen, 1967] has succeeded in explaining a relatively large share of the total variation in earnings, using a data set including family background variables. These studies have included such variables as parent's income, achievement motivation, race, father's intelligence, high school grade point average, mother's education, size of high school class, and military service.

The significance of these variables changes from one study to the next. Griliches has argued that whereas it may be possible to ignore native ability and family background in explaining the differences in earnings, absence of such explanatory variables places a constraint on the study [Blaug, 1976(a), p. 842]. The present study uses Census data, which do not have family background variables. The absence of these variables places a constraint on the study [Kiker and Condon, 1981; Blaug, 1974] but does not negate the findings. A similar approach with Census data was used by Goodman [1979].

Freeman [1980] noted that the rates of return to education, both over time and as levels of education increase, have declined. Blaug [1974, 1976(a)] and Goodman [1979] have noted that the returns to education decline as the levels of education increase.

Some models of returns to education raise the question: Do earnings depend primarily on the attainment of degrees? Goodman

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[1979] finds that the rate of return for college is substantially less than that for high school, while Blaug [1976(a), p. 842] speaks of the "low or even negative private rates of return to graduate education in the U.S." The present analysis will examine this issue to see if Michigan colleges fit the pattern.

The overall objective of this study is to estimate the rate of return to education based on earnings by age and years of schooling in Michigan. A theoretical discussion precedes the rate of return estimates and serves as a framework for the empirical analysis to follow. The major limitation involved in dealing with a single state is the mobility of the labor force on one hand and students on the other. It is possible, however, that someone has obtained his education in the U.S. outside of Michigan or in a foreign country and works in Michigan. It is even more probable that some persons have acquired their education in Michigan and work somewhere else.

To proceed with regional estimates of the rates of return to education, one has to assume that the costs and benefits related to education refer to persons who are both educated and employed in the same region. At least one can assume that the majority of observations will refer to persons in this category. Another possibility is to treat the estimated rates as *ex ante* rates of an individual who graduated from Michigan schools and expects to work in Michigan. Someone who wants to consider employment in another state can make adjustments for the profitability in question. Investment in human capital, for purposes of this study, is limited to formal schooling only.

The principal reason for estimating the rates of return is to determine where an additional dollar of educational resources should be allocated within the educational system. Whereas it is not necessary to select a discount rate against which internal rates of return are estimated, the results are meaningless unless they are compared with a rate that shows the general social return to alternative investment. This approach will be helpful in

estimating the rate which equilibrates social time preferences and alternative productivity of capital, both with respect to future income streams. The return on long term corporate bonds shall constitute the social discount rate against which the rates of return to education are calculated. At the time the data were collected, the return on AAA-rated corporate bonds was 9.63 percent, and it is assumed that this rate provides a reasonable approximation to an average market rate of return.¹

The methodology for making such estimates has been discussed by Blaug [1974, pp. 23-60, 200-34]. For this study, the following approach has been used.

(1) Salaries and wages are separated from other components of income, e.g., dividends received, interest earned, and so forth. Therefore, only earned income, i.e., wages and salaries, is considered as income. Throughout this paper, "earnings" refers to wages and salaries. Before tax earnings enable the social rates of return to be estimated.

(2) All persons above the age of 65 have been excluded. It is assumed that age 65 constitutes the retirement age.

(3) Separate estimates for men and women have been made. The cross-sectional data on earnings for men and women allow the preparation of age-earnings profiles for males and females by education.

From these data, the age-earnings profiles shown in Figures I, II, III were constructed. Figure I shows the earned income stream over the life cycle for males and females combined, given specific age and education. Figures II and III show the age-earnings profiles for males and females separately. These figures are based on the cross-sectional data of the Census (sample size 92,709) for 1980. These data illustrate that persons who do not

¹This paper uses 1980 Census data, which were collected in 1979. An annual average of the AAA rated corporate bond rate for 1979 of 9.63 percent was used to compare educational returns. For 1970, the 1969 AAA rate corporate bond rate of 7.03 percent was used for the same reasons.

FIGURE I
Crude Age — Earnings Profile (Male & Female)
Before Tax 1979 in Michigan

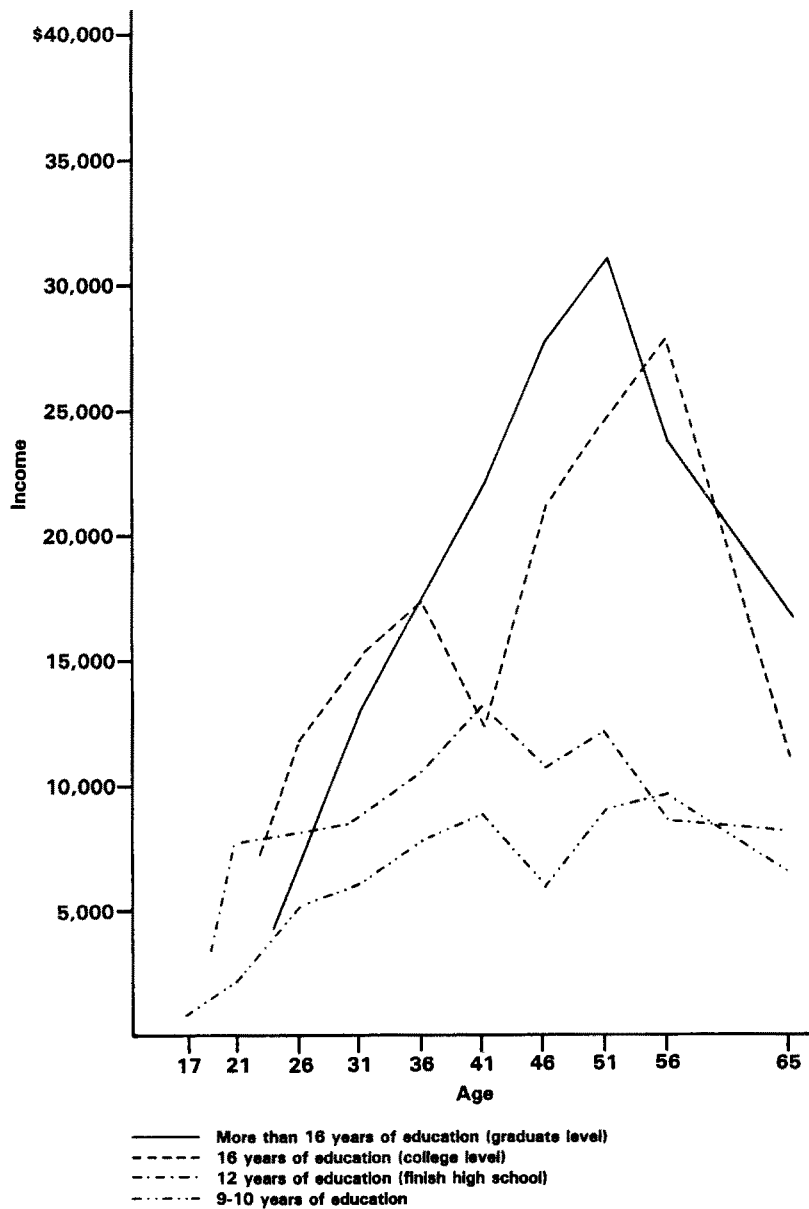


FIGURE II
Crude Age — Earning Profile (Male)
Before Tax 1979 In Michigan

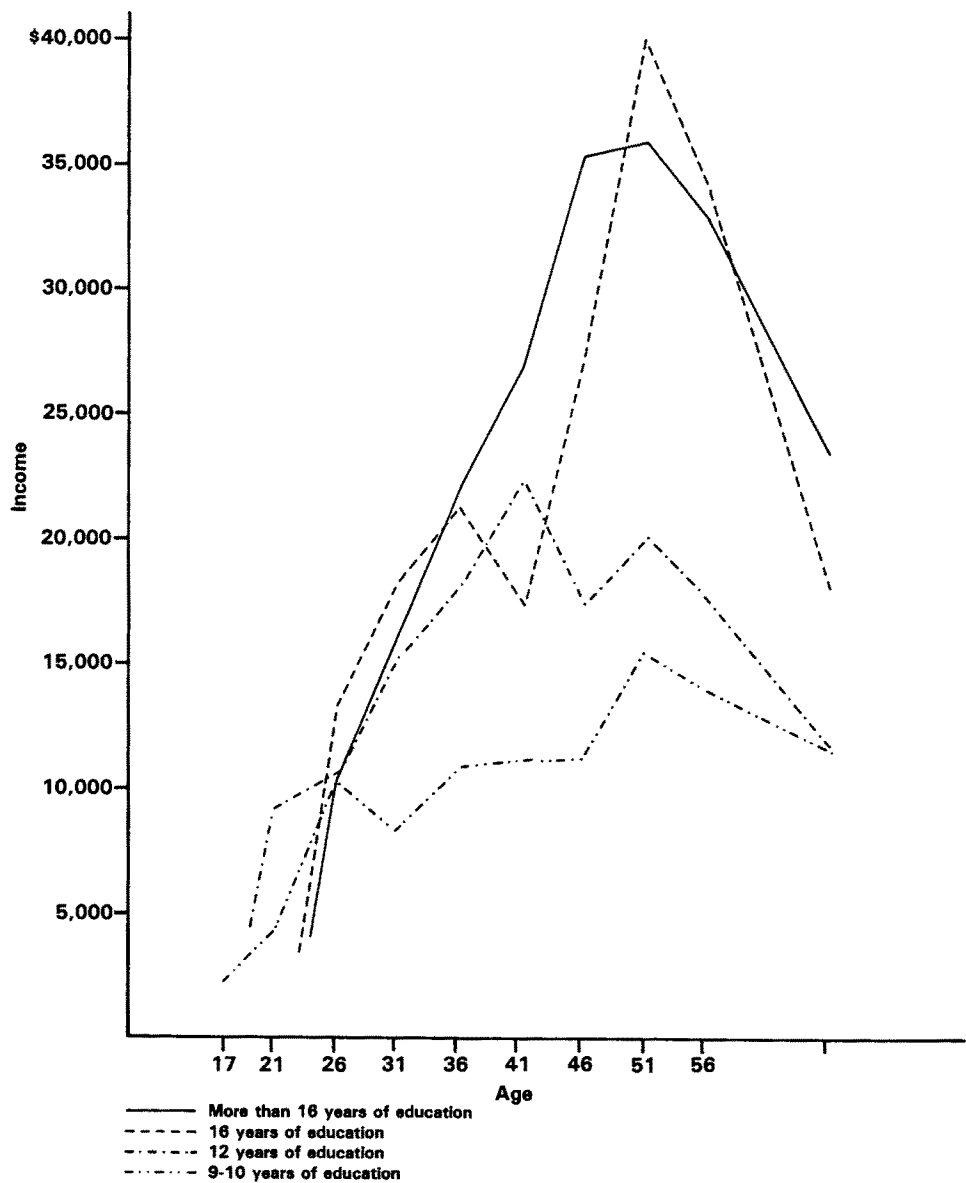
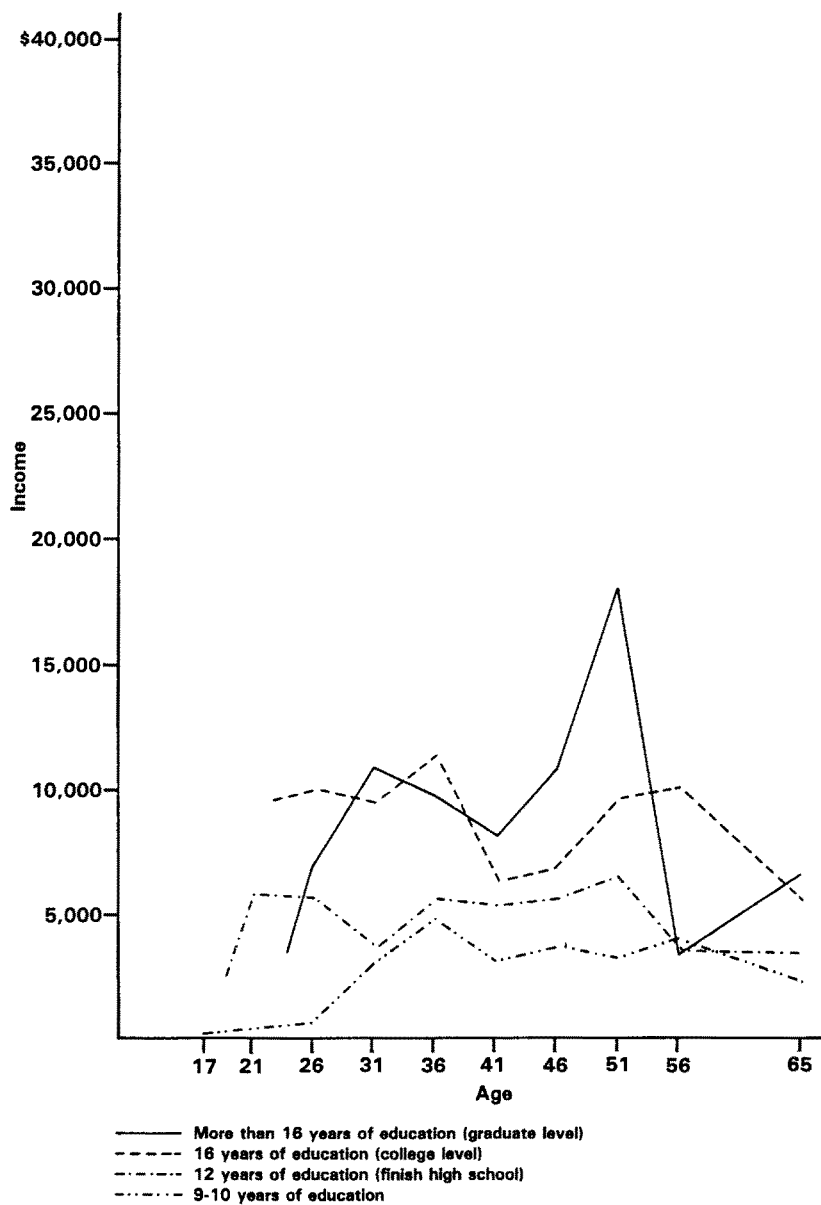


FIGURE III
Crudge Age — Earning Profile (Female)
Before Tax 1979 In Michigan



complete a high school education receive the lowest earnings over the life cycle.

High school graduates receive higher returns, but the data show that between the ages of 50 and 60 years, the earnings of those who have not completed high school were higher than those who had completed high school. This may be due to the fact that some females enter the job market after they have completed obligations of raising their families. Since they have little or no job experience, they are hired at lower wages and thus the average earnings for high-school educated females declines at this point. It is reasonable to assume that longer labor market experience for the women with less than high school education accounts for their higher earnings over the women who completed high school but have little market experience. The earnings of the males who complete high school remain higher than those who do not throughout the life cycle.

When comparing the earnings of those who have completed four years of college with those who did not study beyond high school, one finds that the starting earnings of college graduates were lower than those who were already in the job market for four years. This discrepancy, however, soon disappears. The university graduates earned more than high school graduates over the life cycle, except when they are around 40 years of age.

When males are separated from females, it is evident that the college graduate female members of the labor force get higher earnings over the life cycle at every step than the females who ended their studies after high school. Males start at a considerably lower level of earnings and though they catch up in a relatively short period of time, their earnings between the ages of 38-42 are lower than those of high school graduates. Beyond this point, the earnings of the university graduates sharply increase and, after reaching a peak at age 51, begin to decline but remain higher than the earnings of high school graduates.

The ages between 38-42 are the peak earning period for high school graduates. Other

studies have shown that a somewhat later overtaking point (the point where college graduates' earnings begin to exceed earnings of high school graduates) is consistent with actual age earnings profiles [Blaug, 1976(a), p. 844].² A possible explanation may be found in the unionization of the labor force in Michigan. For the female labor force (Figure III), the peak years of earnings for college graduates are between ages 50 and 56. For female high school graduates, earnings reach their peak at age 51.

People who receive over 16 years of education start with earnings below those of high school graduates or college graduates and do not catch up with the university graduates until they reach 36 years of age. Their earnings peak around 51 and begin to decline beyond that point. Figure I (based on the data) also shows that people with four years of college earn higher incomes than those with more education during the period between ages 53 and 60. Between ages 60 and 65, people with over 16 years of education earn more.

Cost of Education

Insofar as the cost of education is concerned, both private and social costs were estimated as the sum in each case of certain direct and indirect costs. Direct costs represent the outlays for schooling purposes, such as tuition and fees paid by individuals. In order to estimate the social rate of return, one has to take into account the total schooling costs, not only the ones borne by individuals. These represent the actual costs of running a school on an annual flow per student basis. These costs include items such as teachers' salaries, administrative salaries, imputed costs on buildings and equipment, materials used, books, and extra travel.

²J. Mincer [1982] believes that "overtaking" occurs at about seven to nine years after entry into the labor force, but other authors place this overtaking point somewhat later.

The indirect costs represent the foregone earnings of individuals while in school. These foregone earnings are equal to the earnings of graduates with qualifications of one step lower than the school level in which the student is currently enrolled. The items that should be explicitly excluded from the direct costs that individuals bear are personal maintenance and food expenses that the individuals have to incur anyway, whether going to school or not.

The direct costs of education refer to the cost incurred by the public schools in Michigan at the elementary, secondary, or higher educational levels. The indirect costs of schooling are obtained from the age-earnings profile of the lower education level in the comparison. The list itself and the methods used to calculate certain difficult items, such as rent on buildings and equipment, are well known to educational planners. The private and social direct costs for high school and college are shown in Table I. The post-graduate costs are assumed to differ only in tuition, which was higher.

The private direct costs were derived by taking a student-weighted average of the costs at all Michigan public colleges and universities. The resulting figures appear above, except for room and board. Because students would incur food costs if not in school, a student-weighted average of board costs was subtracted from the room and board total.

Indirect costs consist of earnings foregone. From the private point of view, these are earnings after tax, while from society's perspective, before tax earnings are used. Earnings are determined by level of education, and the assumption is made that indirect costs are equal to the average earnings of people who have completed the next lowest educational level. Thus, the earnings foregone of a high school graduate are the average earnings of elementary school leavers, and the earnings foregone of a university graduate when completing the fourth year are the average earnings of a college student who has completed three years of college.

In addition, since it is possible that workers may suffer unemployment, foregone earnings

TABLE 1
Private and Social Direct Costs Per Student Per Year (1979 Dollars)

Level	Private Direct Cost					Social Direct Cost		
	Tuition and Fees	Books and Personal	Room and Board	Travel	Total	*Current \$	Capital Outlay	Total
High School (grades 1-12)	0	0	0	0	0	2044.19	159.25	2203.44
College	1032	675	731	318	2756	5092.00	46.00	5138.00

Source: Derived from *Michigan Statistical Abstract* [1979, pp. 234-39].

*Represents expenditure on instruction, administration, attendance, health, transportation, fixed charges, operation of plant, and maintenance. Room and board represents what is left over after subtraction from total room and board (\$1,629) of a student weighted average of board costs. For graduate students, tuition averaged \$2,109.

were adjusted downward by the average unemployment rate which workers at every level of education suffer. These rates are shown in Table 2. This adjustment lowers all rates of return, but lowers the higher educational level rates least.

TABLE 2

Unemployment Rates By Sex and Educational Attainment, 1979

Level of Schooling	Male (%)	Female (%)
1-3 Years of High School	11.9	12.7
Four Years of High School	5.5	6.1
1-3 Years of College	4.3	4.3
4 or More Years of College	1.9	3.0

Source: *Statistical Abstract of the U.S.*, 1985 [p. 407].

The original earnings data are derived from U.S. Census tapes. To adjust for taxes paid, one subtracts the average taxes paid for a representative household in the same income bracket. For example, in the sample, the average person with three years of college earned \$12,130. Tax on those earnings was \$714.80, giving an after-tax income of \$11,415. The calculations assume the tax rates applicable to a married couple, with one earner and two dependents [*Statistical Abstract of the U.S.*]. Taxes would be higher and rates of return lower for other family types. To obtain the total private and social costs of education, the indirect costs are added (earnings foregone before and after tax) to the direct costs of tuition, room and board, and so forth. Thus, total private and social costs of education are obtained. Table 3 shows the earnings data, both before and after tax.

Of all the three levels of education, the elementary and secondary grades have the largest fraction of direct social costs paid for by the state. Of course, because of earnings

 TABLE 3
Average Earnings of Workers,
Before and After Tax

Level of Schooling	Before Tax	After Tax*
Less than High School	6546	6775
High School grad.	8523	8406
1-2 Years College	11423	10821
3 Years of College	12130	11415
4 Years of College	15316	14091
Over 4 Years College	16682	15239

*Taxes assume 1979 rates applicable to a married person, two dependents, and one wage earner. The lowest earnings level also has the possibility of making use of the earned income credit.

Source for tax structure: *Statistical Abstract of the U.S.* [1984, p. 329].

foregone, high-school graduates bear some of the total costs of education. Table 4 shows that the fraction of direct social cost paid by the student rises with the level of education. However, note that on a per-student basis, college students receive more aid, since it costs more to education a college student.³ The ratio of total private to total social costs of education are also shown in Table 4.

The Rate of Return to Investment in Education

Calculating the benefits of an investment over time requires the progressive discounting of benefits lying farther into the future. The present value of a stream of yearly benefits B over time T can be calculated as follows:

$$\text{Present Value} = \frac{B_1}{1+r} + \frac{B_2}{(1+r)^2} + \frac{B_T}{(1+r)^3} + \dots + \frac{B_T}{(1+r)^T} \quad (1)$$

³The social direct cost for college education is \$2,203.44, completely paid for by government, while the social direct cost paid for by government for college students is \$2,382 = \$5,138 - \$2,756.

TABLE 4
Ratios of Private To Social Costs of Education
By Level of Education, 1979*

Level	Ratio of Direct Private To Direct Social Cost	Ration of Total Private Level To Total Social Cost
High School (grades 1-12)	0.	.77
4 Years College	.46	.78
Post Graduate	.63	.83

Source: Computed from Tables 1, 2, and 3.

*The first column of Table 4 shows that the undergraduate (4-year) students pay 46 percent of direct costs. The second column shows that earnings foregone are a major source of the costs of higher education for individuals.

A person considering a college education has, in some broad sense, a choice between two streams of earnings over his or her life-time (see Figure IV). Stream A begins immediately but does not rise very high; it is the earning stream of a high school graduate. Stream B (the college graduate) is negative for the first four years (owing to college tuition costs), followed by a period when salary is less than what the high school graduate makes, but then it takes off and rises above Stream A. Both streams are illustrated in Figure IV.

Obviously, the earnings of the college graduate would have to rise above those of the high school graduate in order to induce someone to invest in a college education (unless, of course, the psychic or consumption-related returns are large). The gross benefits—the difference in earnings between the two streams—must total much more than the costs because such returns are in the future and therefore discounted.

The preceding discussion emphasized that investing in a college education is worthwhile if the present value of the benefits (monetary and psychic) are at least as large as the costs. In mathematical terms, this criterion can be expressed as:

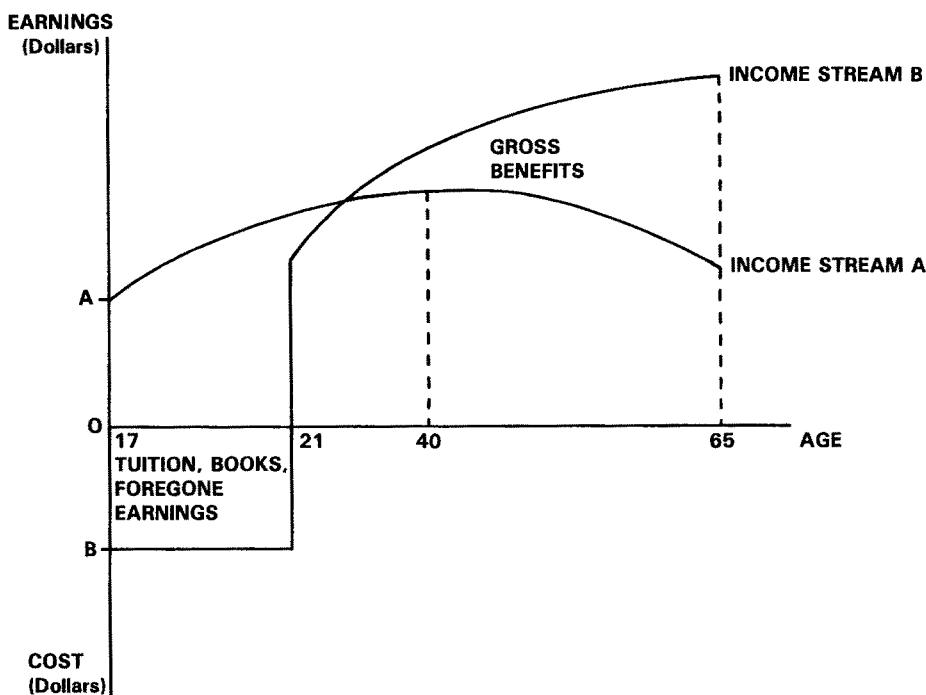
$$\sum_{t=0}^T \frac{(B_t - C_t)}{(1+r)^t} \geq 0, \quad (2)$$

where C_t equals the annual costs of a college education and B_t equals the yearly differences in earnings between college and high school graduates.

There are two ways one can measure whether the criterion in equation (2) is met. Using the present-value method, one can specify a value for the discount rate, r , and determine if the present value of benefits is greater than or equal to costs. Alternatively, one can adopt the internal rate of return method, which asks, "How large could the discount rate be and still render college profitable?" Clearly, if the benefits are so large that even a very high discount rate would render college profitable, then the project is worthwhile. In practice, one calculates this internal rate of return by setting the present value of benefits equal to costs and solving for r . If the internal rate of return exceeds the alternative rates of return, the investment project is considered profitable. In this study, the internal rate of return method has been adopted.

In order to estimate the rate of return, one

FIGURE IV
Alternative Income Streams



brings returns and costs together into a single stream of age-specific net returns, which may be either positive or negative. How are net returns streams or gross returns to education computed? *Direct and indirect costs* incurred at various levels of education are considered as negative earnings, and additional positive earnings during working life (above what people with the next lower level of education earn) are the benefits.

Once the net returns to any level of education have been established, the rate of return to other levels of education can be obtained by repeating the procedure. Let the annual cost of learning be C , the learning period be s years, and the annual increase in earnings be Y_t for a working life of n years. Y_t represents the difference between earnings with a higher level of education and a lower level. Thus, the internal rate of return is simply the discount rate at which the present value is equal to zero:

$$PV = \sum_{t=1}^n \frac{Y_t}{(1+r)^t} - \sum_{t=-s}^0 \frac{C_t}{(1+r)^t} \quad (3)$$

In this case, the rational investor will choose to acquire the skill with the highest present value.

What enters in the calculation of the rate of return is a function of the purpose for which the rate of return is wanted. If the purpose of the rate of return is to estimate the private returns to investment in education, for example, then benefits should refer to earnings after tax and costs should refer to private costs only, as incurred by individuals. Moreover, costs should include only the tuition and incidental costs of schooling plus any foregone earnings as borne by the individual. If, however, one wants to show the rate of return of resources devoted to education from society's point of view, then the benefits should refer to income before tax.

Costs should include the total outlays related to education and not only the often small part paid by the student.

For each level of education, a private and social rate of return exists. For an individual, the private rate of return is what is equated or weighed against the market rate of return applicable to alternative investments (in this study proxied by the AAA corporate bond rate). For each level of education, private and social investment would be undertaken so long as the rate of return is larger than the rates of return of alternative projects. For every higher level of education requiring more expenditure over a greater number of years, the prospective stream of returns is also higher. The rate of return is, therefore, positively affected by exogenous changes in Y_t resulting from growth factors probably in the surrounding economy.

Conversely, the rate of return is adversely affected by increases in the cost of education, which represents a larger deduction from the income stream. Further, for any given stream of Y_t and C_t , any increase in the rate of return to alternative investment would spell a smaller investment in education since the rate of return is equated to a higher alternative return from the market. These results are presented in Table 5. 1970 results are presented in parentheses. Males and females are combined in Table 5 to determine an overall return to education for society as a whole.

Interpretation of the Rates of Return

The estimated marginal rates of return, discounted over the working life span of 50 years (working age in the U.S. being 16-65 years), are presented in Table 5. The upper left hand box gives the marginal (private and social) rates of return for providing 9-12 years of education (together with the typical age of students receiving 9-12 years worth). The second box gives the marginal (private and social) rates of return for one to two years of college. In other words, if a student has completed a Michigan high school, and is considering attending a college in Michigan

for two years, the marginal private return for those two years would be 6.88 percent, while the marginal social return would be 6.53 percent. The diagonal elements represent marginal rates in the sense that they refer to an increment of schooling. Off-diagonal elements (not computed) would refer to average rates of return for several increments of schooling.

It should be noted that the data in Table 5 are marginal in the sense of referring to an increment of schooling, but average in the sense of being computed from an overall age group. For the individual, this may be a problem since he or she cannot be sure of being representative of his own age cohort. However, this is not a problem for society as a whole, since policy cannot be made for each individual case.

The highest private returns (8.91 percent) accrue to college graduates and are much higher than the social rates of return (8.62 percent). These results imply that the large subsidies to public education pay off for the individual, but not as much for the society as a whole. The extra taxes college students pay over their lifetimes due to higher earnings do not compensate society for the educational subsidies given. In addition, these rates are somewhat higher than for high school graduates, and much higher than for post graduate education or for one to two years of college. The rates of return imply that it is preferable, both from the private and social point of view, to complete a college education than to drop out after two or three years of college. Hence, there is considerable compensation for completing college, both for individuals and society.

The marginal rates for completion of one or two years of college are the lowest for the individual as well as society. However, for individuals who receive three years of college education, both private and social marginal rates of return are higher than for those who receive education beyond four years of college but lower than the college graduates. The private rates of return for people with three years of college education remain below

TABLE 5
Social and Private Rates of Return To Education,
Men and Women 1979 (Percent)*

		Age 6-13 8 Years of Education	Age 14-17 9-12 Years of Education	Age 18-19 13-14 Years of Education	Age 20 15 Years of Education	Age 21 16 Years of Education
Age 14-17	Private	8.75 (7.9)				
9-12 Years of Education	Social	8.21 (7.6)				
Age 18-19	Private		6.88 (6.8)			
13-14 Years of Education	Social		6.53 (7.0)			
Age 20	Private			8.30 (5.8)		
15 Years of Education	Social			7.97 (6.0)		
Age 21	Private				8.91 (5.9)	
16 Years of Education	Social				8.62 (6.2)	
Age 22-23	Private					7.05 (7.4)
17-18 Years of Education	Social					6.81 (7.8)

*These rates of return have been computed on the assumption of a discounting period extending from the end or termination of any particular level of education until the end of service life (65 years of age).

Note: Figures in parentheses are for 1970.

the level of high school graduates.

The private and social rates of return are lower for those who receive education beyond four years of college education compared with high school or college graduates. The social rates of return for the post-college graduate education and high school graduates are roughly the same. Private rates of return to post graduate education are lower than the social rates of return. In other words, individuals benefit slightly more from the first two years of higher education than

society does. The higher level of social returns to a four year college education implies that the most desirable investment for the State of Michigan is in four year college education.

When one compares the social and private rates of return to various levels of education with the returns on AAA rated corporate bonds, returns on such bonds are found to be higher across the board for 1979. The rates of return to various levels of education in 1969 were also compared against the AAA rated corporate bonds in that year (7.03 percent).

It was found that the social as well as private rates of return for high school graduates and people with two years of post-baccalaureate education were higher than the returns on corporate bonds. The private and social rates of return at all other levels of education were below the AAA valued corporate bond rate. The low returns to post-baccalaureate degrees in 1979 may reflect the impact of inflation on costs of higher education. The relative position of the four year college education has improved in 1979 over 1969, in terms of both private and social rates of return to education. Whereas people with two years of college education fared better than the college graduates in 1969, their situation in 1979 worsened.

On comparison, this study finds that society's investment in primary, secondary, college, and graduate education in Michigan yielded lower returns than AAA rated corporate bonds. However, this conclusion is subject to certain qualifications.

First, these rate of return calculations may be subject to certain downward biases. Among these are the possibility that there are non-pecuniary benefits of occupations that are accessible only to more highly educated people, that education may provide indirect spillover benefits to people other than educated people, and that education may provide future consumption benefits.

Second, whether or not the returns to education yield lower returns than alternative investments depends on the yield on those alternative investments. This study has used a rate that attempts to measure the opportunity cost of public funds. However, the rate at which the public discounts future benefits (a time preference rate) may be different.

Third, one computes rates of return with the idea of allocating resources to those uses with highest yields. However, society may have objectives other than allocative efficiency. Society may want to provide disadvantaged people with equal opportunity by providing them with educational aid, making it possible for them to achieve higher education.

Summary and Conclusions

In this paper, rates of return to different levels of education in the State of Michigan have been estimated. It has been noted earlier that the cost of higher education increased significantly during the decade of the 1970's and now the first, third, and fourth most expensive state universities in the nation are located in Michigan. This paper has, therefore, attempted to analyze the impact of the high cost of schooling in Michigan on the private and social returns to various levels of education.

The purpose of this study was to investigate whether social rates of return to higher education will tend to exceed private rates, as costs of education rise and inflation leads to higher nominal earnings and higher tax rates. This study, however, shows that social rates of return do not exceed private rates of return for any educational levels. For all levels of education (high-school through post-graduate), it is still true that private returns to education exceed social returns. Thus, in Michigan, private rates of return to education are always higher than social rates, confirming previous results in the literature.⁴ This study does not support the hypothesis that higher costs of education and inflation will lead to social returns to education being higher than private returns.

In general, these results show that higher education implies higher earnings. However, this study finds that students receiving four years of college education can earn higher incomes than students with some graduate education. Marginal rates of return for five levels of education were also computed. These returns show that the highest social rates of return accrue to students with four years of college education and both the social and private rates are lowest for two years of col-

⁴Blaug [1972, p. 230] states that "private rates of return are almost always higher than corresponding social rates . . . reflecting relatively high levels of state subsidies to education."

lege. It is, therefore, concluded that funds from community colleges (one to two years of education) should be reallocated toward four year colleges.⁵

Another conclusion that follows from these results is that investment in education in Michigan leads to lower returns than investments in general. This conclusion, however, must be qualified based on the points previously discussed. A reduction in the private cost of education, in turn, would result in higher private returns. This would serve as an incentive for people to acquire higher education.

This study also provides some evidence in favor of the credentialist view. This argument is that school is a screening device which certifies that people receiving a degree possess certain qualities which should be rewarded. Thus, individual years of schooling would not be important, but completion of a major level of schooling (e.g., high school graduation) is important. For example, a person with a high school diploma and one with one year of college should earn the same amounts.

It was found that private rates of return are higher for both high school graduates and for college graduates than for those students (one to two years of college, some graduate study) who completed levels of education not necessarily involving a degree. If the credential were not important, there would be a tendency (other things being equal) for the marginal return to the fourth year of college education to be the same as the marginal returns to the second and third year.⁶ This

finding also means that some previous work [Blaug, 1976(a)] showing continuous declines in returns with additional levels of education has not been supported in Michigan.

This study further shows that there has been some decline in the rates of return to education, when compared with the yield on alternative investments (measured by the AAA corporate bond rate). In 1970, some (though not all) of the social rates of return exceeded the corporate bond rate. This implies that education at that time yielded society at least as high a return as alternative social investments. However, in 1980, the corporate bond rate exceeded the social returns to education at all levels. That AAA corporate bonds yielded higher returns, during the period of relatively high unemployment, than investment in education is not surprising.

The differences in rates of return, given the various biases which these calculations are subject to, may not be significant. Unemployment, of course, affects both the benefits from increased education (since additional earnings may be lower), and the costs (since foregone earnings will fall). Incorporating these effects leads to generally lower private and social returns, although the returns do not differ by more than 0.15 percent from returns computed by ignoring unemployment effects. This study shows that college graduates continue to enjoy somewhat higher rates of return than high school graduates. Investment in college education, therefore, continues to be highly desirable.

⁵This conclusion is based on the assumption that the majority of the students who attend community college do not acquire a baccalaureate degree. This does not imply that students who attend four years colleges necessarily complete the requirements for a bachelors degree.

⁶It is possible (even probable) that returns may not be equated between different levels of education due to disequilibria, and one observer [Blaug, 1972, p. 231] believes that disequilibria are "almost everywhere" in educational investment.

REFERENCES

M. Blaug, *An Introduction to the Economics of Education*, Baltimore and Middlesex, England: Penguin Books, 1972.

———, "An Economic Analysis of Personal Earnings in Thailand," *Economic Development and Cultural Change*, 23, October 1974, pp. 1-32.

———, "The Empirical Status of Human Capital Theory: A Slight Jaundiced Survey," *Journal of Economic Literature*, 14, September 1976 (a), pp. 827-55.

———, "The Rate of Return on Investment in Education in Thailand," *Journal of Development Studies*, 12, January 1976 (b), pp. 270-83.

A. B. Carroll and L. A. Ihnen, "Costs and Returns For Two Years of Postsecondary Technical Schooling: A Pilot Study," *Journal of Political Economy*, 75, December 1967, pp. 862-73.

The College Cost Book, 4th ed., College Entrance Examination Board College Scholarship Service, New York, 1984.

The Detroit Free Press, August 14, 1984, p. 1.

R. Freeman, *The Overeducated American*, New York: Academic Press, 1976.

———, "The Facts About the Declining Economic Value of College," *Journal of Human Resources*, 15, Winter 1980, pp. 124-42.

J. O. Goodman, "The Economic Returns of Education: An Assessment of Alternative Models," *Social Science Quarterly*, 60, September 1979, pp. 269-83.

B. F. Kiker and C. M. Condon, "The Influence of

Socioeconomic Background on the Earnings of Young Men," *Journal of Human Resources*, 16, Winter 1981, pp. 94-105.

W. F. MacMahon and A. P. Wagner, "Expected Returns to Investment in Higher Education," *Journal of Human Resources*, 16, Spring 1981, pp. 274-85.

Michigan Statistical Abstract, Graduate School of Public Administration, Michigan State University, various issues.

J. Mincer and H. Ofek, "Interrupted Work Careers: Depreciation and Restoration of Human Capital," *Journal of Human Resources*, 17, Winter 1982, pp. 3-24.

T. W. Schultz, "Investment in Human Capital," *American Economic Review*, 51, March 1961, pp. 1-17.

Statistical Abstract of the United States, U.S. Department of Commerce, Bureau of the Census, various issues.