

THE FOREGONE EARNINGS OF HIGH-SCHOOL,
COLLEGE AND UNIVERSITY STUDENTS.

by

Stephen Kagann

January 1975

No. 75-23

NOTE: Not to be quoted without specific permission from the author.

The Foregone Earnings of High-School
College and University Students*

INTRODUCTION

The largest single cost of providing secondary and higher education in the United States is one that is absent from the national GNP statistics. This omission occurs because the expense is an implicit cost, namely, the potential earnings which students must relinquish when they decide to attend school rather than seek employment.

The earnings that students forego, an opportunity cost in the lexicon of economists, represents a real loss to the individual students who must alter their circumstances relative to their working contemporaries. Society must also consider the loss of production when over 20 million persons are not full-time participants in the labor force because they attend school.¹

The concept of foregone earnings as an opportunity cost retains its validity whether the decision to continue school is based on the desire of the individual student, on informal pressures from family, friends, or society at large, or on laws that require school attendance to a certain age. Only in the first case is a conscious choice among alternatives made by the student. When pressures or coercion are behind the decision, then we say that "society" has determined that income should be foregone in favor of further investment in educated individuals.

In spite of the importance of foregone earnings, only economists concerned with the national investment in human capital,

*I would like to express my gratitude to Professors Fritz Machlup and Theodore W. Schultz for their encouragement, criticisms and suggestions and to Ms. Gertrud Kronwinkler for expert research assistance. Responsibility for the results rests with the author. This study was supported by grants, RO-6437-72-129 from the National Endowment for the Humanities and GS-31887X from the National Science Foundation to Professor Fritz Machlup of New York University.

¹For reasons to be explained, this study will only be concerned with full-time students, of whom there were 20.3 million in 1970.

and the students themselves appear to have given this implicit cost the attention it deserves. The purpose of this paper will be to calculate the earnings foregone by all individuals enrolled in institutions of secondary and higher education in the United States for the year 1970. Before presenting these results, however, it will be useful to survey the techniques used by other investigators.

A Survey of the Literature

The original and perhaps most important contribution to the discussion of the foregone earnings of students is the work of Theodore W. Schultz.¹ The method used by Professor Schultz is outlined as follows:

- (1) Students were separated by sex and by level of attendance, that is, high school and college and university.
- (2) "The year 1949 was taken as a base year in determining the 'earnings' per week of young people, both males and females, for each of four age groups."²
- (3) "Students' foregone earnings were calculated on the assumption that, on the average, students forego 40 weeks of such earnings, and then expressed in earning-equivalent weeks of workers in manufacturing in the United States."³
- (4) For the year 1949, Schultz listed the median annual income and average number of weeks worked for males and females in the age groups 14-17, 18-19, 20-24, and 25-29. From these figures, he calculated the average weekly income by age group and sex.

¹Theodore W. Schultz, "Capital Formation by Education," The Journal of Political Economy, Vol. LXVIII, (December 1960), pp. 572-583 and also his Investment in Human Capital, (New York: Free Press, 1970).

²Schultz, "Capital Formation by Education," p. 573

³Ibid., p. 573.

- (5) By multiplying the average weekly income by 40 weeks, the approximate number of weeks in the academic year (and therefore the number of weeks of work students are assumed to forego), he derives an estimate of the annual earnings foregone in attending school of \$583 for high-school students and \$1,369 for college or university students. Given the average weekly wage in manufacturing, these figures translate into an equivalent of 11 weeks of earnings of manufacturing workers in 1949 for high-school students and 25 weeks for college and university students.¹
- (6) The derived standards, 11 and 25 weeks, are then multiplied by the average weekly earnings in manufacturing for the years 1900, 1910, 1920, 1930, 1940, 1950, and 1956. The result is reduced by the average unemployment rate for the whole economy during the given year. After this adjustment we have the estimate of foregone earnings of \$626 per high-school student and \$1,422 per college or university student in 1950 and \$855 and \$1,943 respectively in 1956.

When Professor Schultz' estimates of earnings foregone per student are multiplied by the number of students in each type of institution, we arrive at total earnings foregone of \$7.563 billion in 1950 and \$12.058 billion in 1956. When the analysis is extended to the year 1970, the estimate by Schultz' technique becomes \$47.580 billion.^{2,3}

¹Lynne Schneider, a research assistant, applying Schultz' method to the 1969 earnings data contained in the 1970 Census found that the weeks equivalent for high-school students was 10 weeks and for college students was 25 weeks, a remarkably consistent result after two decades. This recalculation is included in the appendix to this paper.

²In a recent study, Lewis C. Solmon uses 1959 earnings data in the 1960 Census in a refined version (Solmon uses age-specific employment rates) of Schultz' techniques to estimate foregone earnings of \$10,702 million for high-school students and \$7,015 million for college students in 1959, "Capital Formulation by Expenditures on Education in 1960," The Journal of Political Economy, Vol. 79 (November/December 1971), pp. 1412-1417.

³This remarkable increase of 529% in two decades is primarily due to inflation and the explosive increase in school population. From 1950 to 1970, enrollments in high schools, colleges, and universities increased from 9.1 million to 23.2 million, a rise of 155%. For an explanation of the inexorable rise in the costs of service institutions such as schools, see William J. Baumol, "The Macroeconomics of Unbalanced Growth: The Anatomy of an Urban Crisis," The American Economic Review, Vol. LVII (June 1967), pp. 415-426. An even earlier analysis, particularly relevant to educational institutions is provided by Fritz Machlup in his book The Production and Distribution of Knowledge in the United States (Princeton: Princeton University Press, 1962), pp. 375-376.

Rudolph C. Blitz, in his own effort to measure the foregone earnings of students, utilized a number of special studies that attempt to estimate the earnings of young people in the full-time labor force.¹ The method of Blitz was to use the statistics provided by these studies as benchmarks from which he derived his own estimates of earnings foregone in 1956 of \$1,504 per high-school students and \$2,350 per college students. The subsequent publication of new data on the employment of students² induced Blitz to revise his estimates downward to \$1,456 in 1955-6 per high-school student and \$2,049 per college student. These figures are 70% and 5.5%, respectively, above those of Schultz.

Blitz makes a number of criticisms of Schultz' technique, all of which suggest a downward bias in Schultz' estimates.³ The most important point raised by Blitz is that the census data on earnings of young people used by Schultz do not separate out the earnings of full-time year-round workers from the part-time or casual workers. Thus, there is a significant downward bias introduced as the figure for the median weekly earnings, particularly for the group of high-school age, includes the low earnings of many high-school students who work either part-time or casually.

¹Rudolph C. Blitz, "A Calculation of Income Foregone by Students: Supplement to 'The Nation's Educational Outlay,'" Appendix B in Economics of Higher Education, ed. Selma J. Muskin (Washington: U.S. Office of Education, 1962) pp. 390-403.

²Arnold Katz, "The Employment of Students, October, 1959," Special Labor Force Reports, No. 6, (Washington, D. C.: U.S. Bureau of Labor Statistics, July, 1960).

³Blitz, op. cit., p. 391-2.

Professor Schultz replied to the criticisms of Blitz by commenting that several factors had been left out in his original article, namely, according to the editor's, Mrs. Mushkin's, note,

"(a) differences in ability and earning capacity between young people of school age at work and those of similar age in school, (b) the lower earnings levels of young persons in the labor force for brief periods only, (c) earnings of the students while they attend school, (d) the higher unemployment rate among young people than in the labor force as a whole. The first two of these factors 'would increase earning foregone and two would decrease them.' Schultz pointed out that in the study presented here [Blitz'], account is not taken of the factors which tend to decrease average earnings foregone, particularly 'earnings from jobs that many students hold while they attend school--earnings that are not foregone.'"¹

Schultz thereby implied that his estimates were still reasonable, given offsetting omissions.

There is reason to doubt that the factors that would decrease Schultz' estimates of foregone earnings of high-school students are nearly as powerful as those which tend to increase the figure. The Federal minimum wage in 1956 was \$1 per hour. If we assume that workers of high-school age, primarily in agriculture, who are not covered by the Federal minimum wage are offset by those who may have earned in excess of \$1 per hour, and calculate a 40-hour week times 40 weeks of foregone earnings, evaluated at \$1 per hour, the typical high-school student in 1956 would forego approximately \$1,600.² Reducing this figure by the 4.1% general unemployment rate, we obtain \$1,534. This figure is still 79% above Schultz' \$855.

¹Ibid., editor's note, p. 392.

²The assumption of 40 weeks of foregone earnings does not take into consideration the fact that many students attend summer school.

Another criticism that can be leveled at Schultz is for his use of manufacturing wages in determining foregone earnings. Data recently published by the Bureau of Labor Statistics show that a minority, 45.6%, of male students, 16 to 19 years old, who are employed, work in blue-collar occupations. The corresponding figure for women is 18.9%.¹ Had the BLS survey included college-age students, the percentage of students who are in manufacturing occupations would have been even lower. Clearly, if the manufacturing occupations are not representative of the alternative aspirations of students, the manufacturing wage will not necessarily be representative of the opportunity cost of school attendance.

In the appendix of his innovative book on Human Capital, Gary Becker uses a simple method to estimate the foregone earnings of students.²

Becker's assumption³ that full-time college students earn 25% of the annual earnings of high-school graduates of the same age, and the similar assumption that full-time high-school students earn 25% of what their contemporaries earn who have completed only elementary school (but are full-time participants in the labor force) results, according to Becker, in

¹U.S. Bureau of Labor Statistics, "Employment of School-Age Youth," Monthly Labor Review, U.S. Department of Labor, August 1972, p. 28.

²Gary S. Becker, Human Capital: A Theoretical and Empirical Analysis, With Special Reference to Education, (New York: The National Bureau of Economic Research, 1964), pp. 169-172.

³Ibid., p. 169, "If 'full-time' students spend three-quarters of the available working time at school and, therefore, have one-quarter (summers) available for employment, the simplest assumption is that they could earn about one-quarter of what they would earn if they were not attending school."

estimates of foregone earnings much lower than those of Schultz.¹

Becker's approach benefits from its clean simplicity. However, to the extent that his estimates are lower than those of Schultz, they are even less valid, since, as will be shown, the estimates of Schultz are too low.

¹Ibid., p. 172, footnote 15.

The Calculation of Foregone Earnings

Ideally, the calculation of the foregone earnings of high-school and college and university students require the following data:¹

- (1) The numbers of full-time students by level of instruction, age, and sex;
- (2) earnings of full-time year-round workers by age, sex, and level of education;
- (3) unemployment rates of non-students by age and sex, and level of education;
- (4) estimates of the earnings of full-time students who also work.

In the following section the availability of the required data will be mentioned together with a discussion, for each case, of the auxiliary assumptions to be adopted when the published information does not exactly meet the specifications set forth above. The analysis will first focus on the year 1970.

The Enumeration of Students

The United States Office of Education publishes detailed information on the number, level status, and sex of students. A summary and enumeration of the high-school, college and university populations for the year 1970 is produced in Table I.

Students who attend full-time are, in general, people in different circumstances than those who attend on a part-time basis.

¹It should be made clear that in any comparison between the method of calculation presented here and the others mentioned in the preceding section, this study has benefited substantially from data not previously available, particularly with respect to the earnings of students, which were first published for the year 1970.

One can safely assume that most full-time students are not full-time year-round participants in the labor force. Conversely, part-time students are mostly individuals who either work regularly or, particularly in the case of women, remain at home to care for children.¹ Assuming that part-time students give up leisure to attend classes

whereas full-time students forego employment opportunities, only the latter group will be included in the estimate of foregone earnings.

¹The incomes foregone by mothers who remain at home to care for children are estimated by Fritz Machlup in The Production and Distribution of Knowledge in the United States, (Princeton: Princeton University Press, 1962), pp. 52-56.

TABLE I

Enrollment of High-School, College and University Students
by Level of Instruction, Status and Sex, 1970

(figures in thousands)

Level of Instruction	Total Students	Full-Time			Part-Time		
		Total	Male	Female	Total	Male	Female
High School	14,626	14,626	7,396	7,230	n.a.	n.a.	n.a.
Undergraduate	6,899	5,165	3,037	2,128	1,734	969	765
Graduate							
M.A. and Ph.D.	864	372	258	114	492	291	201
Professional	170	150	138	12	20	17	3
Total Graduate	1,034	522	396	126	512	308	204
Total, all levels	22,559	20,313	10,829	9,484	2,246	1,277	969

Note: Because the published data on enrollments are for October of any given year, to estimate the 1970 calendar year enrollments, we have taken weighted averages of 1969 and 1970 enrollments. The weights are 5/9 of 1969 enrollments (January, 1970-May, 1970) and 4/9 of 1970 enrollments (September, 1970-December, 1970).

Source: High School, U.S. Bureau of the Census, Statistical Abstract of the United States, 1971, (92nd edition) Washington, D. C. 1971, p. 104, Table 153; Undergraduate and Graduate Students, U.S. Office of Education, National Center for Educational Statistics, Opening Fall Enrollment in Higher Education, 1970.

Earnings of Non-Students

The United States Bureau of the Census publishes an age-income profile of male and female workers including data on "year-round full-time workers,"¹ a category of particular value since it would exclude students who are part-time or occasional members of the labor force.² The figures relevant to young workers are reproduced in Table II.

TABLE II
Median Income of Year-Round
Full-time Workers by Age and Sex, 1970

<u>Age</u>	<u>Male</u>	<u>Female</u>
14-19	\$3,950	\$3,783
16-19	3,984	3,809
18-22	5,469	4,511
20-24	6,655	4,928
25-34 (with 4 years of college)	11,425	7,755

Source: United States Bureau of the Census, Current Population Reports, Report on Consumer Income, Series P-60, except for the 18 - 22 age group which is based on unpublished data of the Bureau of the Census.

If the typical high-school student is between 14 and 17 years of age, the age grouping given by the Bureau of the Census, that is 14 to 19, is clearly not optimal. To resolve the problem of overlapping age categories, it will be necessary to adjust the statistics to derive reasonable estimates of the potential earnings of high-school students. To arrive at an estimate of the potential earnings

¹United States Bureau of the Census, Current Population Reports, Report on Consumer Income, Series P-60.

²Recall that the major criticism of Schultz' method of calculating foregone earnings of students, particularly in regard to high-school students, was that the lost earnings figure was biased downward due to the inclusion of the earnings of students who worked part-time or during the summer months.

of high-school students, we first assume that the Federal minimum wage is the lowest rate of pay that a student who contemplates entering the work force on a full-time basis may expect. The largest number of workers not covered by the minimum wage law are in agrarian occupations, household service and certain types of part-time work. As high-school students are widely believed to be more industrious than those who drop out, it follows that most students would aspire to more remunerative occupations in manufacturing, clerical and technical professions.

The available data give further support to the contention that the minimum wage should be lowest rate of pay which will be considered in the estimate of the potential income of high-school students. A Federal survey of young workers, ages 16 to 21 in October 1969, shows that while 51% of all 16 and 17 year old workers surveyed earned less than the minimum, the largest group of individuals ages 16 to 21 (41%) with incomes less than the minimum were students, while among those not in school only 14% earned less than the minimum.¹ Thus, it would appear that those who work at part-time jobs are most likely to earn less than the minimum while those who leave school to pursue full-time work generally earn more than the minimum.

In 1970, the Federal minimum wage for covered workers was \$1.60 per hour. On the basis of a 40-hour week and a 52-week year, the minimum annual wage of a full-time worker was \$3,328. As the median

¹Vera C. Perrella, "Young Workers and Their Earnings," Monthly Labor Review, U.S. Department of Labor, July, 1971, pp. 3-11.

income in Table II of workers aged 14 to 19 includes the income of 18- and 19-year old high-school graduates, the median income of workers aged 14 to 19 is undoubtedly too high as an estimate of the potential earnings of high-school students. To compensate, a simple average of the minimum annual wage of full-time workers and the median income of males and females, aged 14 to 19 is taken. This revision gives an adjusted median income of persons of high-school age of \$3,639 for males and \$3,556 for females.

Fortunately, the Bureau of the Census has provided unpublished estimates of the median income of year-round full-time workers 18 to 22 years old in the year 1970. As this age grouping is roughly coincident with that of college students, the estimates will be accepted as the potential income of college students. The figures are \$5,469 for males and \$4,511 for females.

In the case of graduate students, the published data leave the investigator a little off target. The age group 20-24 includes recent college graduates as well as others, who may be high-school dropouts, high-school graduates without college and those who may have discontinued a college education after a short tenure. Conversely, the figure for median earnings for individuals with exactly four years of college, aged 25 to 34, includes individuals who have high incomes due to education as well as accumulated experience.

Unlike full-time high-school and college students, the age distribution of graduate students is somewhat amorphous. Many begin graduate studies after a period of time in the civilian labor market or in the military. While most professional programs may be relatively brief, the successful Ph.D. candidate will typically be over 30 years of age at the time he completes his degree requirements. According to a recent study for the Carnegie Commission on Higher Education,

"The median student will have completed his bachelor's degree after four years at the average age of 22. He will then work or undergo military training for two years, beginning graduate school at 24. His master's degree will require two full years despite the nominal one year requirement so that he will be 26 when he passes this gate. It will take him six additional years to obtain the doctorate. ...Thus he will receive his Ph.D. at the median age of 32."¹

Once again, to estimate the potential income of full-time graduate students, a figure obviously too high, because of the excessive width of the age bracket, will have to be manipulated. The earnings of males and females, aged 25 to 34, with four years of college, will be averaged with one that is too low, the median income of males and females aged 20 to 24. The adjusted median earnings of graduate students are \$9,040 for males and \$6,342 for females.

The obtained estimates of potential median incomes of students are summarized in table III.

TABLE III

Estimated Potential Incomes from Full-Time Work of Full-Time Students by Level of Instruction and Sex, 1970

<u>Level of Instruction</u>	<u>Male</u>	<u>Female</u>
High-School Students	\$3,639	\$3,556
Undergraduate Students	5,469	4,511
Graduate Students	9,040	6,342

¹Stephen H. Spurr, Academic Degree Structures: Innovative Approaches, The Carnegie Commission on Higher Education, (New York: McGraw-Hill Book Co., 1970), pp. 122-123.

Unemployment

The Bureau of Labor Statistics provides data on unemployment rates by age and sex. These rates will be used to adjust foregone earnings by level of enrollment.

As the Bureau no longer publishes unemployment rates for those 14 and 15 years of age, the rate for 16 and 17 years will be used for high-school students. Rates are also given for "18 and 19 years" and "20 to 24 years." A weighted average of these two statistics will be applied to college students. Finally, the rate for individuals "25 to 34 years" will be assumed to be applicable to graduate students.

TABLE IV

Applicable Unemployment Rates,
by Academic Age Group and Sex, 1970

<u>Age Group of</u>	<u>Male</u>	<u>Female</u>
High-School Students	16.9	17.4
College Students	10.3	10.6
Graduate Students	3.4	5.7

Source: U.S. Bureau of Labor Statistics, Handbook of Labor Statistics, 1971.

Earnings Not Foregone

The purpose of this paper is the estimation of earnings that students forego by going to school and thereby reducing the time available to seek employment. However, as many students do work

part-time throughout the year or casually during the summer vacation period, they have incomes and these actual incomes must be deducted from our estimate of foregone earnings as these realized earnings represent earnings that are not foregone.

Unlike other studies, which assumed 40 weeks of foregone working time, we have provisionally assumed that students forego employment all 52 weeks of the year. If the approximately 40 weeks of the academic year is taken as the relevant figure, a downward bias is introduced, because many students also choose to attend summer classes and thereby reduce the opportunity to seek full-time summer employment.

Until very recently, no data were available on the annual earnings of all students who worked, whether on a part-time or casual basis. Fortunately, estimates of the median annual earnings of students, aged 16 to 21, by sex, for the year 1970 have been published by the Bureau of Labor Statistics.¹ The relevant earnings statistics and the numbers of young people who worked are reproduced in Table V.

As these estimates of the earnings of students are limited to the 16 to 21 year age group, we must look elsewhere for the earnings of graduate students. In 1967, the United States Office of Education published a report which included data concerning the sources of income of graduate students.² In this report the total income from

¹U.S. Bureau of Labor Statistics, "Employment of School-Age Youth," October 1971, Special Labor Force Report 147, (1972), p. 30.

²United States Office of Education, The Academic and Financial Status of Graduate Students: Spring 1965 (Washington, D. C.: 1967), pp. 19-23.

all sources for the year July 1, 1964 through June 30, 1965 was estimated at \$520,072 thousand for all full-time male graduate students and \$144,705 thousand for full-time female graduate students. These figures include receipts from all sources such as employment, assistantships, fellowships, gifts, spouse's income, loans and withdrawals from savings. However, we are only interested in income from employment and consequently must make an appropriate adjustment. Among the males, 42% of the total receipts was earned through "own employment," teaching assistantships, research assistantships and faculty appointments. Applying 42% to the total gives \$218,430 thousand in earnings from employment. The corresponding percentage for women was 32% or \$46,306 thousand in earnings from employment. With 130,045 full-time males and 42,384 full-time females, we obtain \$1,680 in earnings per male student and \$1,093 in earnings per female student for the period.

No recent studies of graduate student income are available. Thus we must estimate the earnings of this group for the year 1970. During the period 1964-65 through 1970 we find that total expenditures of institutions of higher education per student rose from \$2,209 to \$2,974,¹ an increase of 34.6%. We will now make another arbitrary but reasonable assumption. That is, we assume that over this period, the earnings of graduate students rose at the same rate as the institutions' cost per student. This procedure gives us an estimate of the 1970 earnings of full-time male graduate students of \$2,261, and \$1,471 for full-time female graduate students. These estimates are entered in Table V.

¹United States Office of Education, Digest of Educational Statistics (Washington, D.C.: Various editions).

TABLE V

Earnings of Full-Time Students, 1970

Level of Instruction and Age	Number of full-time students employed		Median Earnings in 1970		Total Earnings		
	Male (Thousands)	Female	Male	Female	Male	Female (thousands of dollars)	
High School,	16-17	1144	876	\$439	\$341	\$502,216	\$298,716
	18-19	204	90	894	589	182,376	53,010
						<u>684,592</u>	<u>351,726</u>
Undergraduate,	16-19	498	384	609	415	303,282	159,360
	20-21	366	273	1162 ^a	799 ^a	425,292	218,127
	22-24	317	68	1162 ^a	799 ^a	368,354	54,332
						<u>1,096,928</u>	<u>431,819</u>
Graduate,	25-34	241	53	2,261	1,471	<u>544,901</u>	<u>77,963</u>
TOTAL						2,326,421	861,508

Source: High-school and Undergraduate students, U.S. Bureau of Labor Statistics, "Employment of School Age Youth, October 1971," Special Labor Force Report 147, (1972).

^a As the report does not give median earnings data for students over 21, the earnings for those 20 to 21 years of age is applied to older students. Furthermore, no distinction is made between graduate and undergraduate students. As some undergraduates are over 25 and, conversely, some graduate students are under 25, the cutoff point is, by assumption, set at 25 years of age.

There is a second component to student income, particularly at the college and university level, which must be examined, namely, fellowship income. The U.S. Office of Education provides data on student financial aid disbursed by institutions of higher education, from Federal and non-Federal sources.

There are three components to financial aid: work assignments, loans, and grants. Work assignments, employment opportunities which are paid for by the sponsoring agency together with research assistantships and teaching assistantships, will have been included in the calculations of student employment and earnings and will therefore be excluded from aid statistics to avoid double counting. As most loans to students must be repaid after graduation, this category will also be omitted.

From the point of view of the individual student, a grant may be considered as income. However, in societal perspective, such payments are transfer payments, not income. Consequently, all grants are excluded from consideration in this analysis of earnings received and earnings foregone.¹

¹Total financial aid disbursed by institutions of higher education, both from Federal and non-Federal sources, amounted to \$1,298 million in 1966-67, the last year for which such data are available. This figure includes \$406 million for work assignments, \$589 million for grants and \$281 million for loans. Of the grants, \$375 million went to undergraduate students and \$214 million to graduate and professional students. Source: U.S. National Center for Educational Statistics, Financial Statistics of Institutions of Higher Education: Student Financial Aid, 1966-67. Based on an estimated enrollment of 3,976 thousand full-time undergraduates and professional-degree students, the average grant in the 1966-67 school year was only \$94 per undergraduate and \$139 per graduate student.

TABLE VI

Earnings Foregone by Students
by Sex and Level of Instruction, 1970

Level of Instruction	Number of Full-Time Students (thousands)		Potential Incomes from Full-Time Year-Round Employment (Per Student)		Potential Incomes of all Students		Potential Incomes Lost Through Unemployment	
	Male	Female	Male	Female	Male	Female	Male	Female
	(1)	(2)	(3)	(4)	(5)=(1)x(3)	(6)=(2)x(4)	(7)	(8)
High School	7,396	7,230	\$3,639	\$3,556	\$26,914	\$25,710	\$4,548	\$4,473
Undergraduate	3,037	2,128	5,469	4,511	16,609	9,599	1,710	1,017
Graduate	396	126	9,040	6,342	3,580	799	123	45
TOTAL	10,829	9,484			47,103	36,108	6,381	5,535

Level of Instruction	Actual Incomes Earned (millions)		Foregone Earnings (millions)		Foregone Earnings (Per Student)	
	Male	Female	Male	Female	Male	Female
	(9)	(10)	(11)	(12)	(13)	(14)
High School	\$685	\$352	\$21,681	\$20,885	\$2,931	\$2,889
Undergraduate	1,097	432	13,802	8,150	4,545	3,830
Graduate	545	78	2,912	676	7,354	5,365
TOTAL	2,327	862	38,395	29,711		

Foregone Earnings, 1970

The preceding analysis can now be summarized in order to calculate the earnings foregone on a national basis and per student, by sex and academic level. The results are presented in Table VI.

The number of full-time students (from Table I) is multiplied by the potential income per student (from Table III) to give the potential incomes foregone. The potential income figure must then be reduced to account for the likelihood of unemployment (from the unemployment rates in Table IV). The remainder must be further reduced by the actual earnings of students (from Table V) to show the earnings foregone.

Before any conclusions are drawn from these results, a comparison with the estimates obtained by applying the approach of Schultz to the 1970 data will be helpful.

Table VII

Alternative Estimates of Aggregate
Foregone Earnings, 1970

	Kagann (millions)	Schultz (millions)
High School	\$42,566	\$20,565
Undergraduate College 21,952		
Graduate School <u>3,588</u>		
Total College and University	<u>25,540</u>	<u>27,015</u>
Total Earnings Foregone	68,106	\$47,580

According to our new estimate, the aggregate cost of investment in education are 43% higher than would be suggested by the Schultz method, and the difference would be even larger if Schultz had used

age-specific employment rates rather than the general employment rate to adjust his results. All of this large differential occurs in the high-school category. However, the aggregate earnings foregone by college and university students obtained by the Schultz method are high (\$27,015 million compared with our \$25,827) because of Schultz' inclusion of all students without regard to full-time or part-time attendance. This becomes clear when we compare the results on a per-student basis.

Table VIII

Alternative Estimates of Foregone
Earnings Per Student, 1970

	Kagann	Schultz
High School	\$2,910	\$1,399
College or University	4,491	3,179

The comparison in Table VIII shows that our estimates of earnings foregone per college and university student are 41% above those based on Schultz' technique and our estimates for high-school students are a full 108% higher.

Conclusions

This study has attempted to show that the cost of the decision to remain in school is significantly higher than had been estimated heretofore. Furthermore, the validity of the many studies which attempt to estimate the monetary rate of return to education is brought into question for, as has been shown, the approaches used in estimating this major component of the cost of education result in significant downward biases. If this is correct, it

follows that the estimated rates of return to college and high school education must have been too high.

APPENDIX

Estimates of Earnings Foregone by High School
and College or University Students in 1969.

Age	Median Income (Dollars)	Weeks Worked	Income Per Week (Dollars)	Annual Earnings Foregone in Attending School	In Weeks Equivalent to Average Earnings of Workers in Manufacturing
14-17					
Male	675	23.7	28.48	1,139	
Female	639	19.4	32.94	1,318	
18-19					
Male	1,667	33.9	49.17	1,967	
Female	1,012	31.6	32.03	1,281	
20-24					
Male	3,804	40.7	93.47	3,739	
Female	2,689	36.0	74.69	2,988	
25-29					
Male	7,521	44.9	167.51	6,700	
Female	3,421	35.3	96.91	3,876	
30-34					
Male	8,633	44.9	192.27	7,691	
Female	3,158	35.3	89.46	3,578	
Per Student					
High School					10 weeks
College or University					25 weeks

Sources and notes.

Column 1: Subject Report Educational Attainment, 1970 Census of Population, U.S. Table 7 & 8, U.S. Dept. of Commerce, Social and Economic Statistics Administration. Median income for 14-17 year olds is a weighted average (by numbers employed) of median incomes 14-15 and median incomes 16-17 year olds. Median income of 20-24 is weighted average of median incomes of 20-21 and 22-24 year olds.

Column 2: School Enrollment, Oct. 1969. Current Population Reports, Series P-20, #206, U.S. Bureau of the Census; U.S. Government Printing Office, Washington D.C. 1970. Weeks worked not available for 14-15 year olds. Weeks worked for 16-17 year olds is used for 14-17 years old bracket. Weeks worked for 25-34 year olds is used for 25-29 and 30-34 year olds.

Column 3: Column 2 divided into column 1.

Column 4: Assume that students forego 40 weeks of earnings: column 3 multiplied by 4.

Column 5: Economic Report of the President, Feb. 1970, Table C-33. U.S. Government Printing Office, Washington D.C.: 1970. The average gross weekly earnings for all manufacturing were \$129.51: Column 4 divided by \$129.51.

Students enrolled in high school were approximately half male and half females. Approximately 94% were 14-17 year olds and 6% were 18-19 year olds. (Current Population Survey, U.S. Dept. of Labor, Bureau of Labor Statistics, June 1973).

College or University Students were distributed as follows:

Ages	Males (Per Cent)	Females (Per Cent)
14-17	1.56	1.64
18-19	18.79	16.19
20-24	26.83	16.73
25-29	9.01	3.35
30-34	3.59	2.31

These percentages are used as weights in calculating the estimate of \$3,218. (Current Population Survey, U.S. Dept. of Labor, Bureau of Labor Statistics, June 1973).