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Expected Rates of Return to Education

Walter W. McMahon

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December 1981

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Abstract

Students' expectations of their earnings after graduation and of growth in earnings as the result of their education are shown to be reasonably accurate in relation to actual earnings. This pattern holds for the US, UK, Phillipines, and Egypt, the only countries for which expectations have been studied directly. It also holds for differences in expected rates of return, allowing for differences in costs by occupational field, by degree level, by type of institution and, to a lesser extent, by race and sex.

The direct study of expected rates of return is quite new, but more studies are appearing because of its significance to student behavior and to educational planning as universities seek to respond to, or influence, student demands in decentralized systems. It has much in common with the study of expectations and rates of return in other branches of economics.

EXPECTED RATES OF RETURN TO EDUCATION

The expected earnings and other returns expected from education over the life cycle when related to costs, as they are in expected rates of return, are of great interest primarily because of their strong influence on student and family decisions about the types and amount of education students seek to acquire. But, if in addition, expected net returns are a reasonably accurate predictor of actual net returns, then the expected rate of return is also a convenient, albeit somewhat incomplete, guide to educational budget and policy decisions designed to achieve social efficiency. In this case if individuals and educational institutions respond by investing more where the private and social expected rates of return are relatively high, the growth of per capita income is facilitated, as well as the growth of productivity and economic growth and development in the society in general.

The expected rate of return is a type of benefit/cost calculation that relates earnings that students expect to receive as the result of their education to educational costs. Specifically, it is that percentage rate of return that discounts the stream of earnings expected by the student (or by others) over his life cycle back to its present value and equates them to the total educational costs compounded forward to the date of graduation.

It is particularly useful for two reasons. First, it permits comparison of the relative return to widely different forms of investment, either in education or with investment in physical capital or financial assets. Second, the rate of return is a widely understood

concept, facilitating communication with the financial community and widely diverse fields within and outside of education. However, it also has its limitations. The major one is that the benefits from education that enter into the calculation are normally limited to earnings, thereby excluding nonmonetary private returns and social-benefit externalities. Since the latter nonmonetary returns should in principle be included, and are omitted only because they are hard to measure, the result is that the total expected returns to education will tend to be understated. The reader should see, however, summaries of the progress made in recent research in beginning to measure these nonmonetary private and social benefits under other entries entitled the Consumption Benefits of Education, and Externalities in Education. Some material relevant to this point will also be found under the entries entitled Option Value of Education, and Spill-Over Effects of Education.

The remainder of this article will consider more specifically the relatively high degree of correspondence between expected and actual earnings and the basic methods of calculating expected rates of return. It will also consider the differences that exist among the expected rates of return to investment in different types of education (e.g., by occupational field, by degree level, and by type of institution) as well as differences in expected rates of return by race, sex, and among those few countries where studies thus far here have been done (U.S., U.K., Philippines, and Egypt). It will be suggested that the evidence that exists indicates that student and family expectations are not so myopic as might be supposed.

Consideration of the way in which student and family expectations actually are formed has implications for the debate between adaptive and rational expectations, as well as for educational policies that attempt to deal with problems of motivation, such as among black male high school underachievers. In sum, the study of expected rates of return, as distinguished from manpower planning approaches, has considerable significance for the socially efficient operation of the relatively decentralized educational systems characteristic of most nations.

1. Measurement of Expected Rates of Return

To measure expected rates of return requires first that information be obtained from the student and perhaps also from his family on the earnings he or she expects to receive at future times over his or her life cycle. This data then can be used to estimate an entire age-earnings profile, similar to those shown in Figure 1, for the level of education the student attains. Before turning to the two main methods used for calculating expected rates of return it is important to consider some data for several countries on the earnings that students expect to receive at graduation and later in their life cycles in relation to actual earnings, since those enter in a major way into the calculation.

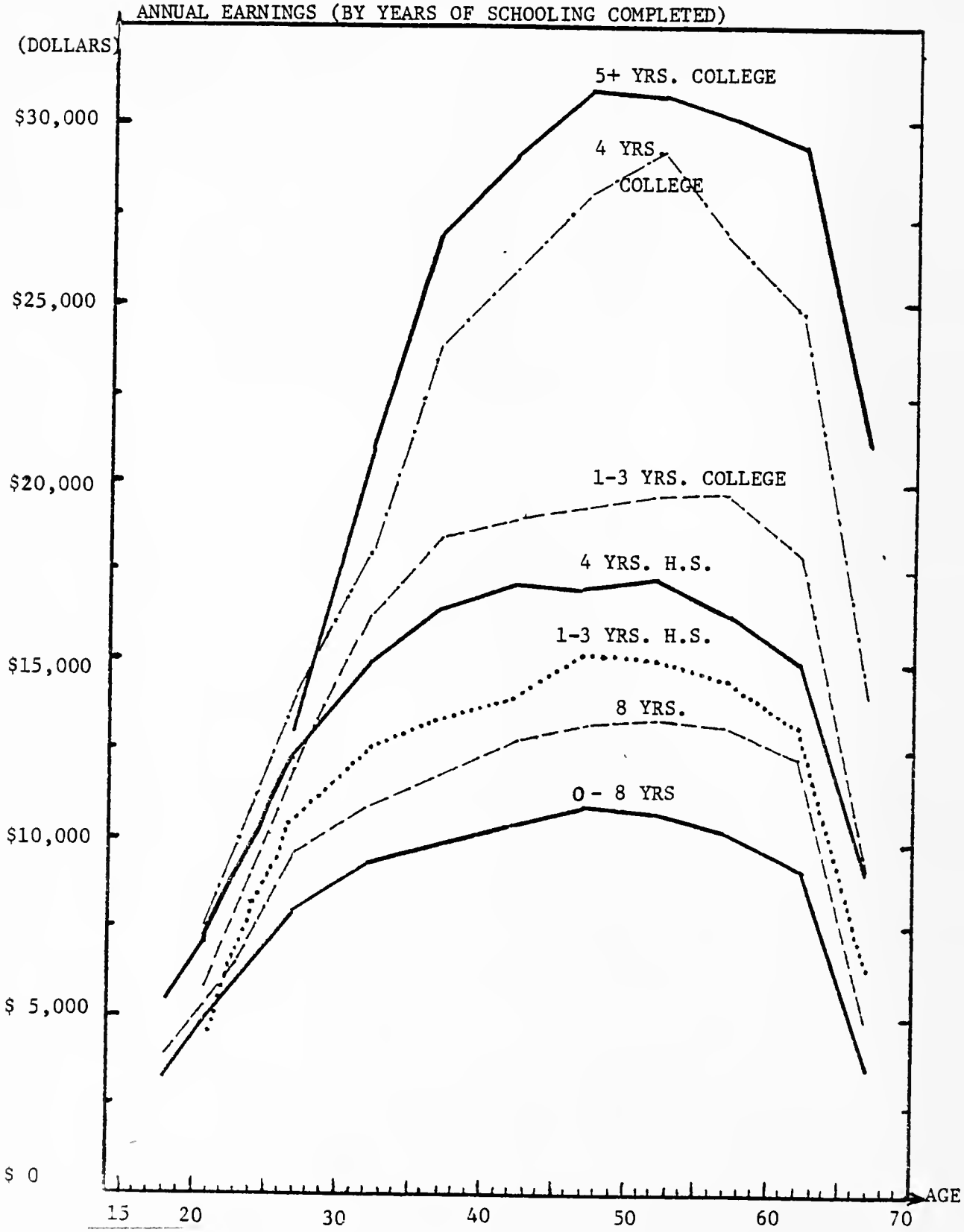
i. Expected Earnings and Actual Earnings

The earnings U.S. students expect to receive when they complete their formal schooling are compared to the earnings they expect to receive 25 years after completion of their bachelors degree in Table 1.

FIGURE 1

AGE-EARNINGS PROFILES OF WHITE MALES IN MARCH 1979

PERSONS 18 YEARS OLD AND OVER



SOURCE: Money Income of Families and Persons in the United States, Current Population Reports, Series P60, No. 123, U.S. Bureau of the Census, June 1980.

Students were asked to estimate their expected earnings in the absence of inflation, (also used for the expected rates of return reported for U.S. students below), based on a nationwide survey of 5,346 college students described in McMahon (1974, pp. 43-8, 167-79) and analyzed further in McMahon and Geske (1982, Chapter 7).

It is clear that both male and female students receiving bachelors degrees in 1975 (at the top of Table 1) expect somewhat lower starting salaries than those who planned to finish masters' degrees in 1976 or Ph.D.'s in 1978. But all groups of students expect a higher rate of growth of earnings later in their life cycle upon completion of college training! Their mean expected salary 25 years hence not only reveals expected age-earnings profiles that are more peaked at each higher degree level, typical of the age-earnings patterns found the world around. But their expectations also compare very closely to the actual earnings patterns for college graduates shown in the U.S. Census data toward the top of Figure 1. This pattern of growth of actual earnings of college graduates in the U.S. has been sustained over a long period of time as reported in Table 2.

Similar patterns have been found in several other countries. There is a close correspondence of earnings expected at graduation with the actual earnings of those who have been in the labor force in the United Kingdom, as well as in the United States as shown in Table 3. If the time is expanded to encompass the first five years after graduation, a reasonably close correspondence between expected and actual starting salaries have been found for the Philippines and Egypt as well. These data are from the only four studies of expected earnings and expected

TABLE 1
EXPECTED STARTING AND FUTURE SALARIES AND GROWTH IN EARNINGS

	Mean Expected Starting Salary	Mean Expected Salary in 25 Years	Ratio Earnings in 25 Years to Starting Salary	Average Annual Expected Real Rate of Growth in Earnings[b]
		Bachelor's Degree		
Male	$10,087	$18,005	1.78	3.56
	(2,792)	(6,768)		
White	10,084	18,038		3.58
	(2,824)	(6,690)		
Black	10,119	17,680		3.39
	(2,493)	(7,603)		
Female	8,457	14,192	1.67	3.08
	(2,479)	(5,600)		
White	8,367	14,054		3.08
	(2,534)	(5,702)		
Black	8,899	14,866		3.04
	(2,152)	(5,070)		
		Master's Degree		
Male	10,346	20,367	1.97	4.84
	(2,864)	(9,188)		
White	10,278	19,235		4.35
	(2,794)	(7,416)		
Black	10,500	22,955		5.93
	(3,024)	(11,942)		
Female	9,000	16,304	1.81	4.05
	(2,566)	(6,643)		
White	8,780	14,876		3.47
	(2,507)	(5,127)		
Black	9,346	18,548		4.92
	(2,631)	(8,023)		
		Doctor's Degree		
Male	11,244	28,296	2.51	8.92
	(5,181)	(22,581)		
White	10,623	27,112		9.13
	(4,685)	(25,104)		
Black	12,884	31,422		8.46
	(6,073)	(13,668)		
Female	10,776	21,848	2.02	6.04
	(4,529)	(16,062)		
White	9,808	19,231		5.68
	(4,029)	(16,555)		
Black	12,523	26,568		6.59
	(4,944)	(14,311)		

Note: Standard deviations are shown in parentheses below each entry.

[a] Coefficient of variation calculated as $s/\bar{x}$ multiplied by 100.

[b] Annual real growth rate calculated from mean expected salary point estimates. Percentage increase from starting salary to future salary divided by number of intervening years: bachelor's, 22 years; master's, 20 years; doctor's, 17 years.

Source: McMahon and Wagner (1981, pp. 276-7)

Table 2

Ratio of Mean Income of College to High School Graduates

Workers		Year												
s	Mid-Point	67	68	69	70	71	72	73	74	75	76	77	78	79
duation	22													
-34	30	1.33	1.32	1.33	1.33	1.27	1.22	1.19	1.15	1.19	1.26	1.21	1.24	1.22
-44	40	1.53	1.47	1.58	1.54	1.55	1.55	1.52	1.55	1.56	1.55	1.48	1.47	1.52

rce: Various issues of Current Population Reports, Series P-60, US Bureau of the Census.

Table 3

Expected and Actual Earnings

	At Graduation (Bachelors) Y_0	After 5 Years Y_5	After 25 Years Y_{25}	Ratio Y_5/Y_0	Ratio Y_{25}/Y_0
United States (dollars)					
Males' Expectations[a]	$10,087		$18,005		1.78
Females' Expectations[a]	8,457		14,192		1.67
Actual Starting Salaries[b]	10,119	11,510	17,405	1.14	1.72
United Kingdom (pounds)					
Males' Expectations[d]	£ 2,100	£ 3,371	£ 5,199	1.60	2.47
Males' Actual[e]	2,399		5,856		2.44
Females' Expectations[d]	£ 1,835	£ 2,587	£ 3,391	1.41	1.84
Females' Actual[e]	2,161	2,894	3,193	1.34	1.47
Philippines (pesos)					
Males' Expectations[f]	9,912	14,892		1.50	
Females' Expectations[f]	6,756	16,380		2.42	
Actual Earnings[g]	n.a.	7,992			
Egypt (Egyptian pounds)		Y_{10}		Y_{10}/Y_0	
Males' Expectations[h]	£ 564	£ 1,512		2.7	
Males' Actual[i]	252	654		2.6	
Females' Expectations[h]	432	1,104		2.6	
Females' Actual[i]	264	481		1.8	

Sources:
a. Table 1 above.
b. McMahon and Wagner (1981, p. 280, Col. 3)
c. Calculated from
d. Williams and Gordon (1981, p. 202).
e. Ibid, pp. 225-6, Col. 1; Y_0 and Y_{25} found by interpolation for ages 20-24 and age 47.
f. Psacharopoulos and Sangal (1981a, p. 459), converted to annual basis.
g. Ibid, text, p. 451 salaries, and p. 460 for Y_{10}.
h. Psacharopoulos and Sangal (1981b, pp. 4) and
i. Ibid, p. 23, annual basis.

rates of return that have been made thus far. The United Kingdom data (and the U.K. expected rates of return discussed below) are from a sample of 2,944 high school students who were planning higher education, as analyzed by Williams and Gordon (1981, pp. 202, 225-6). The Philippines data are from a nationwide sample of 9,105 college students collected by the International Institute for Educational Planning and analyzed by Psacharopoulos and Sanyal (1981a, p. 451). Egyptian data are from a sample of 1935 college students and 1712 other college graduates, also collected by the International Institute for Educational Planning with the Supreme Council of Universities and analyzed by Psacharopoulos and Sanyal (1981b, p. 4).

The accuracy of students expectations in the United Kingdom about earnings 25 years hence is also remarkable; males expect earnings to grow 2.47 fold, whereas the General Household Survey shows that actual earnings of graduates have grown 2.44 fold, for example. Expectations of earnings five and ten years after graduation in both the Philippines and Egypt are overly optimistic (see Table 3). But expected inflation was not fully removed in these cases, and even at that, the rate of increase in expected earnings as shown in the last columns of Table 3 are not all that much greater than the percentage increases in actual earnings. Female expectations are somewhat optimistic in all countries including the U.S. in relation to the age-earnings profiles actually experienced. But opportunities have been improving for women in some nations, e.g., see Ferber and McMahon (1979), and continuation of these improvements may be expected by students.

ii. Method of Calculation of Expected Rates of Return

There are two basic methods for calculating the expected rates of return. The first uses the standard formula, widely understood in educational and in all other branches of finance for calculating a pure internal rate of return, whereas the second uses the first derivative of an expected-earnings function estimated by regression methods. Both involve using a smaller number of points to approximate the expected age-earnings profiles illustrated in Figure 2 as $E_1(t)$, earnings expected at each age from graduation up to retirement, and $E_0(t)$, which measure foregone earnings prior to graduation, and after graduation represent the earnings that could have been expected in the absence or the increment to education. For the expected rates of return,

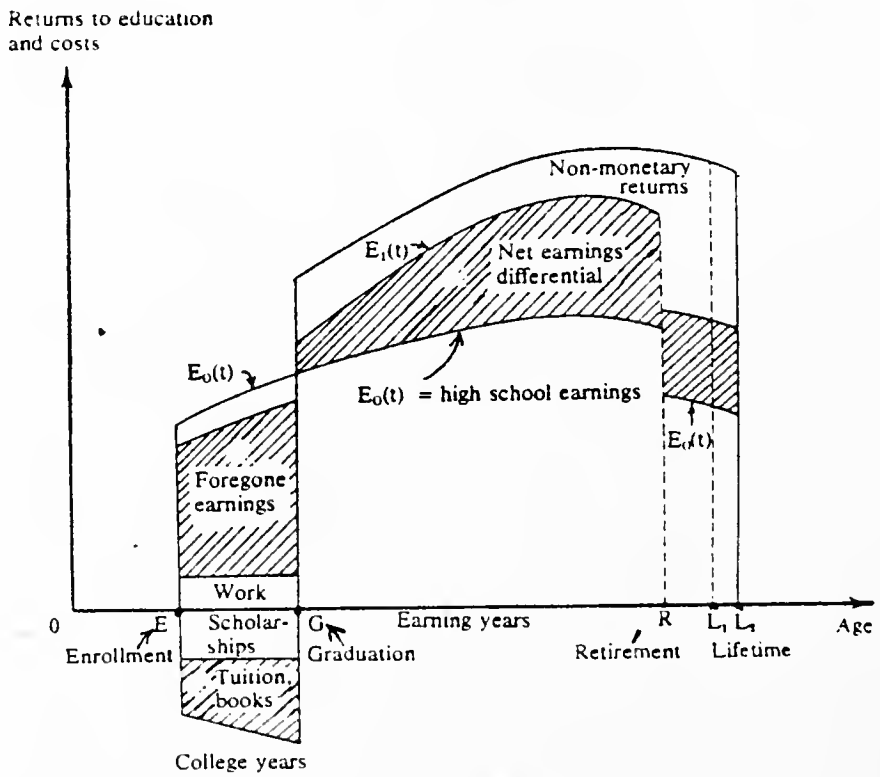


Figure 2. Investment in Higher Education and Private Returns over the Life Cycle

the two points of earnings expected at graduation (Y_0) and earnings expected 25 years hence near the peak of the age-earnings profile (Y_{25}) are used to determine the level of each age-earnings profile. Each profile is assumed to be the same shape as those observed in Figure 1 to determine the values for all other years to calculate the "net earnings differential." Williams and Gordon (1981) use similar points (specifically Y_0, Y_5, and Y_{25}) for the U.K., but assume that earnings rise linearly between these points to peak at Y_{25}, and then level off until retirement at age 65 to compute expected lifetime earnings. This then is used as the dependent variable in an expected earnings function.

The pure expected rate of return, r*, is given by solving the following formula iteratively on the computer, using individual micro data for each student:

$$(1) \quad \sum_{t=E}^{G} [E_0(t)+C(t)](1+r^*)^t = \sum_{t=G}^{R} [E_1(t)-E_0(t)](1+r^*)^{-t}$$

where the terms, as illustrated in Figure 2, are

$E_1(t) - E_0(t)$ = the expected net earnings differential attributable to the next higher level of education,

$E_0(t)$ = the foregone earnings, or indirect costs,

$C(t)$ = direct costs consisting of tuition and fees (if any), books, and special fees,

r^* = the expected rate of return,

t = age,

$E,..,G$ = beginning of education to graduation, for the level of education being evaluated, and

R = retirement.

The "short cut method" suggested and used when appropriate by Psacharopoulous (1980) and by Psacharopoulous and Sanyal (1981a, 1982b) focuses on the net earnings differential at graduation, Eq. (2a) or at the overtaking age eight years after graduation, Eq. (2b):

$$(2a) \qquad r^* = \frac{E_1(G) - E_0(G)}{\sum_{t=0}^{5} [E_0(t) + C(t)]}, \quad \text{or} \quad (2b) \qquad r^* = \frac{E_1(G+8) - E_0(G+8)}{\sum_{t=0}^{5} [E_0(t) + C(t)]}$$

This short cut has the strong advantage of being easy to calculate for approximate comparisons. But the authors recognize that Equation 2a especially must be used with caution because the focus on initial earnings does not take into account the growth of earnings thereafter and therefore underestimates pure rates of return. Starting salaries can even be below the earnings of high school graduates whose steady growth of earnings on the job while others are in college preceeds less growth later. Notice the close proximity in Figure 1, for example, of earnings of 22 year olds with high school diplomas to those facing low starting salaries after college, compared to the potential for growth later. Starting salaries can be very erratic, especially in recessions, and can involve initial periods of unemployment, in relation to salaries at the overtaking age eight years later. See also the entry on "Student Labor Market Expectations".

The second method in use for calculating expected rates of return is to estimate an earnings function of the type originally developed by Mincer (1974), or with variants that measure the school-leaving age differently as used by Williams and Gordon (1981, p. 218):

$$(3) \qquad \ell nE = \beta_1 s + \beta_2 s^2 + \beta_3 st + \beta_4 t + \beta_5 t^2 + \beta_6 A + u$$

where:

ℓnE = log of annual expected earnings,

s = number of years of schooling,

t = number of years of experience on the job,

A = ability test scores to control for differences in ability, and

u = disturbances.

The partial derivative of this function, $\partial \ell nE / \partial s$, is then the expected rate of return to the last year of shool--when t represents the overtaking age and therefore is set equal to approximately eight years of experience.

Expected Rates of Return

Using the first, more elaborate formula, expected rates of return vary widely by occupational field and degree level as shown in Table 4. The rates shown are expected social rates, including the full institutional cost specific to each student at each type of institution, which are more relevant to policy decisions and more practical for international comparisons.

i. Expected Rates of Return by Occupation and Degree Level

The lower expected rate of return at each higher degree level reading horizontally across Table 4 is a pattern typically found. It is caused primarily by higher foregone earnings costs at each successively higher degree level. Rising foregone earnings costs lower the rates of return, even though expected earnings are higher at each level,

Table 4

Expected and Realized Social Rates of Return, U.S. White Males Students By Occupation and Degree Objective

(standard errors, computed as $s/\sqrt{n}$, are shown below each mean)

Occupation	Degree Level				All Degree Levels	
	Associate	Bachelor's	Master's	Doctor's/ Professional	Average,[a] Expected	Reali
Health		16.1 (1.5)		11.1 (1.0)	12.7	7.
Doctor, Dentist				12.2 (.8)	12.2	11
Health Technician		9.1 (2.5)			9.4	
Pharmacist		20.1 (1.1)		3.9 (4.8)	15.2	12.
Lawyer				15.5 (2.1)	15.5	14.
Engineering - Technical	36.4 (8.0)	24.4 (2.2)	8.5 (.7)	7.2 (.8)	19.0	12.
Architect		23.6 (2.3)	10.5 (1.6)		17.2	8.
Engineer		18.9 (2.0)	10.0 (.6)	7.4 (.4)	14.1	11.
Elec. Technician	41.3 (4.1)	43.8 (1.0)			40.8	28.
Business	22.1 (1.4)	17.1 (.9)	10.4 (.7)		15.9	11.
Accountant	23.0 (1.1)	17.8 (1.5)	10.7 (1.2)		17.3	9.
Manufacturing Manager		16.0 (.8)	10.8 (.9)		13.2	15.
Sales, Retailing		16.6 (1.1)			15.5	12.
Other Professional		7.6 (1.6)	7.8 (1.0)	1.4 (1.6)	6.5	3.
Clergyman				-2.1 (3.6)	-2.8	-17.
Natural Scientist			7.4 (3.0)	3.2 (3.1)	9.4	7.
Social Scientist				-4.8 (4.5)	-4.1	
Education		10.3 (1.5)	0.0 (1.6)	3.1 (2.0)	3.8	-2.
Elem. & Sec. Teacher		10.3 (1.6)	-.8 (1.6)	2.0 (3.0)	3.3	-3.
College Professor				5.2 (1.2)	7.8	5.

Source: McMahon and Geske (1982 Chapter 7)

as was shown in Table 1. In another illustration of the effects of variation in costs on expected rates of return, the economies of scale in educational institutions in LDC's (see Psachacopoulos (1981c) and unemployment among the young and less skilled both operate to reduce direct and foregone earnings costs. If the later ages in the life cycle of expected earnings are taken into account, the effect of these lower out-of-pocket and opportunity costs is to raise expected rates of return, and hence to encourage expansion of investment in junior college and other post secondary education.

These expected rates of return are averaged across all degree levels within each occupational field of study in Column 5 of Table 4. They then can be compared with the actual rates of return as given by U.S. Census data in Column 6, and with expected rates of return by occupation in Egypt (and elsewhere) as in Table 5. The students' expected rates of return first can be seen to be quite accurate estimates of the actual rates of return for each degree field. The highest expected and actual rate of return fields are medicine, engineering, and business administration, with expected and actual rates of return that are all in the 12%-15% range. The lowest expected rate of return fields are elementary education and the ministry (as well as music, which is not shown), falling in the low -17% to +3.3% range. There is evidence from studies using 1960 Census data by Eckhaus, et. al. (1974, pp. 352-7), that similar patterns of differences in rates of return have tended to persist over relatively long periods of time. Since other studies find that students' choices are heavily influenced by differences in expected private monetary rates of return--see Freeman (1971), Ferber and McMahon

(1979), and McMahon (1982). This persistence of different rates of return is most likely to be due in part to the limitations on entry imposed by some fields (e.g., medicine), combined with the relative ease of entry in other fields (e.g., primary and secondary education). It is also possible that there are larger expected psychic and social benefits in some fields, such as music and the ministry. If so, the true expected rates of return are understated in these fields in Tables 4 and 5, explaining persistence of some differences in the expected purely monetary rates.

The expected rates of return for Egypt shown in Table 5 reveal a very similar pattern. Again, medicine, architecture, and the physical sciences (the latter may include some of what is called engineering in the U.S.) are at the high end, in the 15%-20% range. The relevance of education to agriculture and business

Table 5

Expected Rates of Return by Field of Study in Egypt

Occupational Field of Study	Expected Rate of Return
Medicine	17.2%
Physical Sciences	14.9%
Architecture	20.3%
Agronomy	15.3%
Commerce	13.3%
Vet Medicine	13.0%
Fine Arts	12.2%
Social Sciences	11.8%
Economics and Politics	11.0%
Overall	15.0%

administration are reflected in the medium-high expected rates of return for Agronomy and Commerce. At the lower end are several fields that may contain a number of prospective teachers, where in the U.S. as well, expected monetary returns are lower.

ii. Expected Rate of Return by Sex and by Type of Institution

When expected rates of return are compared internationally, as in Table 6, a remarkable similarity emerges among male students, expecially at the bachelors level. Females in all of the countries

Table 6

Expected Social Rates of Return for Several Countries
By Sex and Degree Level

	U.S.[a] (1976)	England[b] (1977)	Philippines[c] (1977)	Egypt[d] (1978)
Upper Secondary				
Male		2.16%		
Female		11.7%		
Higher Education				
Males, Bachelors	15.2%	13.0%	15.8%	15.4%
Masters	14.9%	9.9%	12.6%	
Ph.D.	16.6%		32.0%	
Females, Bachelors	37.2%	9.9%		14.5%
Masters	30.4%			
Ph.D.	21.6%			

Sources:
a. Ferber and McMahon (1979, p. 416-17), using Eq. (1) above.
b. Williams and Gordon (1981, p. 219), using a variant of Eq. (3).
c. Psacharopoulos and Sangal (1981a, pp. 468-9). This one column reports actual rates of return for all students, since the expected rates "must be downward biased as they are based on initial earnings" only. It uses Eq. (2b).
d. Psacharopoulos and Sangal (1981b, p. 12), using Eq. (2a).

shown receive significantly lower earnings (e.g., 74% of male earnings in Egypt, 66% in Great Britain, which also lowers foregone earnings). The higher rates of return expected by females in the U.S. may partly be due to the increasing entry of women into more advanced degree programs, followed by employment in the high-earnings fields such as medicine, business administration, engineering, and law, as mentioned above.

Relatively little is known about how expected rates of return differ by type of institution. The only study that incorporates the specifics of private and total cost differences among institutions to calculate private and social expected rates of return is for the United States, and appears in McMahon and Geske (1982, Chapter 7, Tables 4 and 5). The conclusions reached there suggest first, that the terminal undergraduate degrees at the public comprehensive colleges and junior colleges where many undergraduate programs tend to be more vocationally-oriented are very cost effective. Expected private rates of return, for example, at the bachelors level are never below 15% in any ability quartile , and average 21% across all ability quartiles. At the same time, the four year liberal arts college and the public and private research universities are more cost-effective for those planning graduate work. At the masters and Ph.D. or professional school levels, both the expected private and social rates of return for those planning advanced degrees are higher in these types of institutions.

These expected (and actual) rates of return are a much more comprehensive measure for use in comparisons then are either the costs of education, or expected returns, taken alone. High cost programs can be viable candidates for expansion if the expected returns are also high,

and visa versa. There are now a number of excellent studies that document the wide variation in costs among institutions; Howard Bowen (1980) develops the differences among higher educational institutions in the United States, Verry and Davies (1976) analyze the economies of scale by degree program and by institution in the United Kingdom, and Pasacharopoulos (1981) develops the major economies of scale in higher education to be found in international comparisons among many less developed countries. There is also a new, but rapidly growing literature on educational cost differentials at the primary and secondary level (e.g., Chambers (1979, pp. 97-110), and McMahon and Melton (1978)).

How Are Expectations Formed?

Whether student expectations are formed by a cognitive process, as is emphasized by the rational expectations hypothesis, or as the result of experience as stressed by adaptive expectations, together with the realism of the resulting expectations, is of significance to educational and other policies designed to aid educational choices and to make labor markets work better. Although average student expectations may be reasonably close to actual job market outcomes as suggested above, there are changes in the job markets that may not be accurately anticipated, overly myopic expectations held by students coming from disadvantaged backgrounds, wider degrees of uncertainty in recession periods, and wider degrees of uncertainty among females, that all affect behavior.

i. The Formation of Expectations

Economists have generally assumed in the past in theoretical and econometric models that income (and price) expectations are formed by

an adaptive process. Milton Friedman's permanent income hypothesis, for example, assumes that expected future income can be estimated by applying a distributed lag to immediate past incomes using geometrically declining weights. This gives the heaviest weight in the formation of expectations about the future to the most recent past experiences. The student of course normally does not have full time earnings experience on which to base his or her expectations about the future growth of earnings. But he does observe what has happened within his family, to friends in his neighborhood and school peer group, to recent graduates, and to older friends of the family and teachers who may sometimes serve as role models. The rational expectations hypothesis has challenged this adaptive process, assuming instead that expectations are formed through a cognitive understanding of how the economy works and what the implications of policy changes are for job markets. Rational expectations are assumed to be subject only to random errors, and to become the basis for deliberate decisions. We cannot hope to settle the dispute here between these extremes, but a more moderate view would suggest that there is some adaptive learning of patterns, and of what to expect by the student, as well as some cognitive extrapolation of changes.

Empirical work over thirty years on the formation of expectations leads George Katona (1980) to conclude that most commonly behavior is guided by repeated and rewarded past experience. This conditions expectations about the future and is consistent with a major stream of learning theory in psychology. He suggests that expectations about change add a "feeling tone that spreads over very many people and influences action"...(whereas) the cognitive (rational expectations) content of

expectations may be vague and may differ from person to person" (Ibid., p. 33). Some adaptive effects are direct--high levels of unemployment among teen agers in 1981-82, for example, lowered opportunity costs and thereby raised the expected rate of return to education, maintaining enrollment in the junior colleges in these years in spite of the effects of falling birthrates. However, some job market changes may be cognitively perceived. The American College Testing Program in Iowa City and the College Entrance Examination Board in Princeton provide information to college and high school counsellors on both college costs and on starting salaries in many occupations in the U.S., shown in McMahon and Wagner (1981, Table 2). And data on the shape of age-earnings profiles as shown in Table 1 above is now available from surveys and census data in many countries.

At the high school level, Charles Benson (in McMahon and Geske, (1982), Chapter 3) reports that both neighborhood experiences and the education (SES) of parents are significant influences on the students' use of time for study and hence presumably on their expectations about the future value of education.

ii. Are Students Myopic?

It is only recently that student expectations have been studied empirically, and found to be fairly accurate with respect to the growth of earnings that students expect following further education, as shown in Tables 1 and 2 above, as well as the earnings growth expected in engineering and other fields in addition to the traditional fields of law and medicine as shown in Table 4. There are significant empirical implications of the fact that students do not appear to be overly myopic,

and focused only on starting salaries, and (as developed further in the entry on Student Labor Market Expectations) on immediate job openings, but anticipate search time after graduation and regard cyclical declines in fields such as engineering as temporary. The controversial thesis of overinvestment in college education, for example, as advanced by Richard Freeman (1975) depends on a myopic preoccupation with starting salaries by students, ignoring the lower opportunity costs of education during the worldwide recessions in 1974-75 and 1980-81 as well as the growth of earnings later in the life cycle.

A model stressing investment by the family, rather than only by the "independent student," stresses that the family's financial resources and the family's expectations as a group help to finance the high school and college years of most students, and to encourage the student's expectations to be less myopic (see McMahon (1982)).

iii. The Uncertainty of Expected Earnings

Although analytically uncertainty can either increase investment in human capital as a hedge, or reduce it, (see Levhari and Weiss (1974, p. 956)), there has been little empirical study of students' uncertainty about their future prospects. Table 7 suggests that females have a higher degree of uncertainty about their expected future earnings 25 years hence than do males as one might expect. T. W. Schultz (1971, p. 182) has postulated that those with lower ability may be more uncertain about their future prospects. But if anything Table 7 suggests that the higher ability males and females who have the higher ACT test scores are the ones that are more uncertain about their expected earnings.

Table 7

Uncertainty About Future Earnings By Sex and Ability
(1=Very Uncertain, to 0=Very Certain)

Ability Level (ACT Test Scores)	Males Mean	Males (n)	Females Mean	Females (n)
All Ability Levels	.46	(1009)	.55	(1668)
22-highest	.49	(538)	.59	(725)
18-21	.46	(195)	.54	(407)
16-17	.43	(85)	.53	(164)
lowest-15	.42	(191)	.49	(372)

Source: Questionnaires and survey as shown in McMahon (1974, Appendix A)

No studies have yet been made of changes in the degree of student uncertainty, or shifts in the dispersion of student expectations over time, although Katona (1980, p. 33) suggests that these changes are relevant to other types of household saving and investment decisions.

In conclusion, expected rates of return appear to be more accurate than might be expected by occupational field, degree level, type of institution, sex, and length of the investment planning horizon. In the absence of accurate means of forecasting manpower needs, they provide a decentralized system with incomplete but useful guides to educational choices conducive to individual and social growth.

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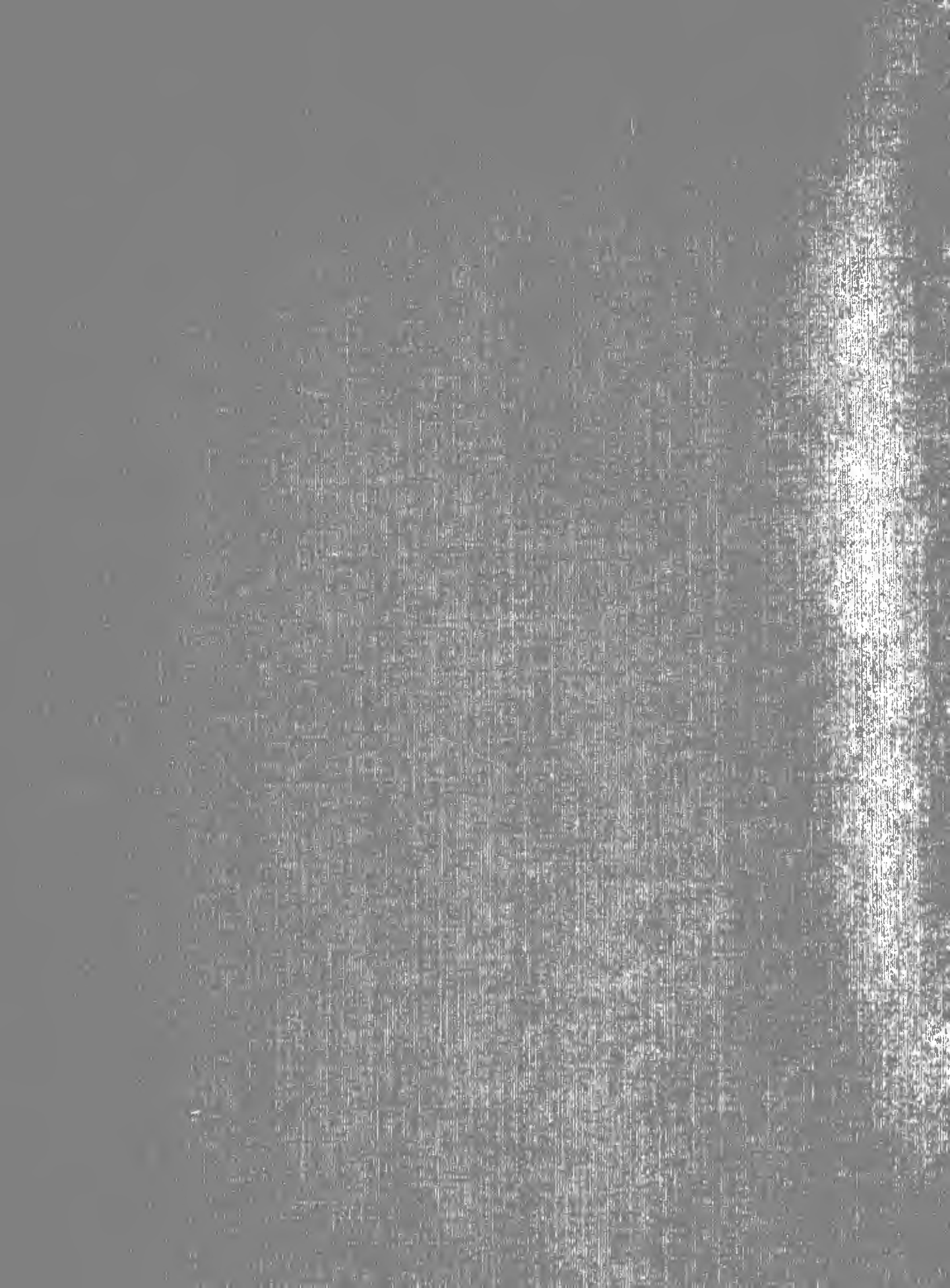

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