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ABSTRACT

In the first part of this paper, estimates of present values or rates of return to education for women on lifetime earnings have been calculated. Subsequently, returns to education for women which derive from their husband's income and their family income are examined. Finally, some implications of the results are discussed. In the first section, data are from the 1/1000 sample of the 1969 Census. For women working full-time, the internal rate of return varies from 6% to 11% for whites, and from 6% to more than 50% for Negroes. Two measures of family income are calculated. The first is the earnings of the woman plus the total income of her husband weighted by the probability that the husband is present at each age. The second measure differs from the first in that only half of the weighted husband's income and family income appear less susceptible to the criticisms raised earlier about estimates f returns through women's earnings in terms of magnitude and stability. Implications of these results include: (1) College education for women was an attractive alternative in 1960; (2) The returns to graduate training as measured through women's earnings appear much higher than the returns through family income; and (3) A family income maximization model may be useful in further examination of the demand for education by women. (Author/CK)

December, 1971

THE RETURNS TO EDUCATION FOR WOMEN

Lee Benham

Although the relationship between women's education and earnings is a question of obvious importance in a society in which women constitude an increasing share of the college population and also an increasing share of the labor force, few attempts have been made to estimate the returns to education for women. Improved knowledge in this area should lead to a better understanding of such phenomena as women's levels of educational attainment, secular changes in these levels, and women's labor force participation. In addition, such matters as the returns to women's education through marriage, women's age at first marriage, fertility patterns, and women's nonmarket productivity may be fruitfully examined in this context.

Almost without exception, past studies of the returns to education for men have examined the relationship between men's level of education and their market earnings.[1] Estimates of present values or rates of return on

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[1] Gary Becker, Human Capital (New York: National Bureau of Economic Research, distributed by Columbia University Press, 1964), pp. 100-102.
Richard Freeman, "The Labor Market for High-Level Manpower." (Unpublished Ph.D. dissertation, Department of Economics, Harvard University, 1969.)
Milton Friedman and Simon Kuznets, Income from Independent Professional Practice (New York: National Bureau of Economic Research, 1954).
Alex Maurizi, Economic Essays on the Dental Profession (Iowa City: College of Business Administration, University of Iowa, reprinted by Bureau of Business and Economic Research, 1969).
George Stigler and David Blank, The Demand and Supply of Scientific Personnel (New York: National Bureau of Economic Research, 1957).
Yoram Weiss, "Allocation of Time and Occupational Choice." (Unpublished Ph.D. dissertation, Department of Economics, Stanford University, 1968.)

lifetime earnings have generally been calculated.[1] In the first part of this paper, similar estimates are calculated for women. Subsequently, the returns to education for women which derive from their husbands' income and their family income are examined. Finally, some implications of the results are discussed.

I

The returns to education for women as measured though their own market earnings are estimated in this first section. Data are from the 1/1000 sample of the 1960 Census. Since a large proportion of women are active in the labor force only part of the time, there is some question as to the appropriate measure of women's earnings to use. Three measures are examined below: earnings for all women, earnings for women working full-time, and earnings for women never married. Table 1 shows these earnings by race for 11, 12, 13-15, 16, and 17+ years of education completed. Internal rates of return for a subset of these groups are shown in Table 2.

For women working full-time, the internal rate of return varies from 6% to 11% for whites, and from 6% to more than 50% for Negroes. Labor force participation increases with education so the returns are higher in all cases when education-specific labor force participation rates are used.[2]

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[1]The limitations of looking only at the pecuniary cost and earnings streams are well known. There is the problem of separating the consumption and investment aspects of schooling. Also, such factors as individual ability, family influence on learning outside of school, quality of school, and acquired tastes all may have an impact on both educational attainment and earnings.

[2]Estimates for never married women were included because of the conventional explanation for the flat age profile of women's hourly earnings: the lack of investment in training on the job. Since women who never married are more likely to be permanent members of the labor force, both they and their employers have more incentive to invest in such training. On this basis, the age profile of hourly earnings should rise more rapidly for the unmarried group, unless there are other, offsetting factors. The estimates of hourly earnings here show only a slightly greater increase by age for this group than for women in general. In addition, when hourly earnings were

TABLE 1

MEAN 1959 EARNINGS AND PRESENT VALUES AT AGE 18
OF LIFETIME EARNINGS FOR ALL WOMEN, WOMEN WORKING FULL-TIME, AND NEVER MARRIED WOMEN
BY RACE AND LEVEL OF EDUCATIONAL ATTAINMENT[a]

Years of Schooling Completed	Mean Earnings of All Women, in Dollars[b]	Mean Earnings of Women Working Full-Time, in Dollars[b]	Mean Earnings of Never Married Women, in Dollars[b]	Present Value (at Age 18) in $1,000's of Earnings of All Women at Discount Rate of 0%	5%	10%	Present Value (at Age 18) in $1,000's of Earnings of Working Women Full-Time at Discount Rate of 0%	5%	10%	Present Value (at Age 18) in $1,000's of Earnings of Never Married Women at Discount Rate of 0%	5%	10%
				White[c]								
11 Years	884	2861	1931	44.0	14.8	7.3	132.1	50.0	26.9	118.4	43.7	22.[illegible]
12 Years	1104	3116	2322	54.3	20.4	11.3	146.5	53.3	28.0	130.6	48.6	25.[illegible]
13-15 Yrs.	1291	3560	2595	61.7	21.2	10.6	159.7	54.2	26.1	145.5	49.9	23.[illegible]
16 Years	1722	4283	3442	81.5	25.0	11.3	181.1	59.3	27.0	170.4	56.3	25.[illegible]
17+ Yrs.	3243	5184	4085	133.6	40.6	17.1	205.7	62.4	26.2	176.3	55.9	23.[illegible]
				Negro[d]								
11 Years	794	1902	751	41.1	14.0	6.7	81.5	31.2	16.7	e	e	e
12 Years	978	2249	1006	44.7	16.7	8.4	96.0	36.7	19.5	e	e	e
13-15 Yrs.	1151	2647	1305	48.8	18.2	9.0	120.3	38.1	17.1	e	e	e
16 Years	2393	3562	2478	127.3	37.3	15.8	159.8	50.7	22.7	e	e	e
17+ Yrs.	3738	4831	5412	e	e	e	e	e	e	e	e	e

[a] Calculated for females of ages 18-65 not enrolled in school at the time of the 1960 census.

[b] Mean wage and salary and self-employment income for women age 18 and over in 1959.

[c] Excluding those with Spanish surnames.

[d] The sample size is quite small for some of the Negro education cohorts especially for women working full-time and never married women. See tables in Appendix.

[e] Number of observations too small to calculate present values.

TABLE 2

INTERNAL RATES OF RETURN TO WOMEN'S EDUCATIONAL ATTAINMENT
ESTIMATED FROM EARNINGS OF WOMEN

Higher Schooling Level of Comparison	All Women			Women Working Full-Time		
	Lower Schooling Level of Comparison			Lower Schooling Level of Comparison		
	12	13-15	16	12	13-15	16
White						
13-15	7%			6%		
16	10%	14%		9%	11%	
17+	18%	25%	44%	8%	10%	8%
Negro[a]						
13-15	18%			6%		
16	35%	>50%		15%	>50%	

[a]Sample size for Negroes is too small to estimate rate of return to 17+ years of education.

Although most of these estimates do not appear unreasonable, there are several characterisits of the earnings profile for women which suggest that estimates of this kind should be viewed with caution. First, the estimates are not very robust across the different labor force participation categories. It has been argued that full-time earnings are a better measure of the full returns. However, the extent to which education influences nonmarket productivity has not been established.

Second, the absolute differences between earnings by education levels are much smaller for women than for men. A consequence of this is that the estimated rates of return are very sensitive to small absolute changes in the estimated costs of training and foregone earnings. There are significant differences in the calculated rates of return for women when costs of training vary as little as $250 a year.[1] Since there is considerable uncertainty about the costs of training and foregone earnings, these specific estimates should be viewed as having large standard errors.

Third, at least to this observer, the differences in earnings by level of education measured here appear small in comparison with the differences in life styles associated with different levels of women's education.

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calculated for women working full-time, with no children, living outside the South, and living in cities with more than 5,000 inhabitants, there appeared to be little difference between the age profile of hourly earnings for women in this group and women in general.

[1]For example, the internal rate of return for four years of college as compared to high school falls from 10% to approximately 8%, for all women if costs go up $250 per year.

II

An alternative approach is to consider as a measure of "full" income the husband's or the family income, since women's life styles appear to be more a function of their husbands' earnings than of their own. This approach has been suggested earlier,[1] but little empirical work has been undertaken in this area. To examine this approach, women's income, husbands' income, and family income by race and educational attainment of women are shown in Table 3.[2]

If the view is taken that only the pecuniary returns should be considered in these calculations, then care must be taken to avoid double-counting, i.e., attributing the same income to both husband and wife.[3] However, is a measure of full income also includes the returns to nonmarket activity, then it is no longer obvious that this problem exists. If the nonmarket productivity of the husband is positively related to his earnings and his wife shares this nonmarket output, then including all the husband's pecuniary earnings in a measure of the returns to the wife's education is not necessarily double-counting. Depending on the effects of education on nonmarket productivity, the returns may even be some multiple of the total pecuniary returns both of the husband and the wife.[4]

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[1] Becker, op. cit., p. 102.

[2] The relationship between women's education and husband's and family income may be in part spurious. Such factors as family background, social class, and parental family income are all associated with educational attainment, with the type of person selected as spouse, and with lifetime income. Thus the question of the net contribution of women's education to own or husbands' earnings or to family income cannot be settled here. This problem is similar to that associated with attempts to separate out the returns to ability and to education.

[3] Becker, op. cit., p. 101.

[4] I appreciate Gary Becker's assistance, on this point.

Two measures of family income are calculated here. The first is the earnings of the women plus the total income of her husband weighted by the probability that the husband is present at each age. The second measure differs from the first in that only half of the weighted husband's income is included.

For white women, the levels of husbands' and family income are higher and the differences by women's educational categories are greater than for women's earnings alone. The difference ($3950) between the annual incomes of husbands of high school and college graduates is almost as large as the level ($4283) of full-time earnings of female college graduates, and several times as large as the difference between the earnings of women at these two educational levels working full-time ($1167). The income of husbands rises consistently with wives' education, except for women with more than 16 years of schooling.

For Negro women, the pattern is not the same. Their husbands' incomes are lower and generally differ less across wives' education then do the women's own earnings. Also, a lower percentage of Negro women are married with husband present. There is a differential of $1270 between the average annual earnings of the husbands of Negro women with 12 and 16 years of education, for those married with husband present. This compares with a differential of $1415 in the women's own earnings and of $1313 in earnings for women working full-time.

Present value estimates are shown in Table 4 and internal rates of return in Table 5. For white women, the returns to college appear to be higher when their husbands' income are considered than when their own earnings are used. This is particularly true for those with one to three years of college. However, the returns to graduate education appear lower by this measure. For

TABLE 3

MEAN EARNINGS, HUSBANDS' INCOME, AND FAMILY INCOME OF WOMEN BY RACE AND LEVEL OF EDUCATIONAL ATTAINMENT

Years of Schooling Completed	Mean 1959[b] Earnings in Dollars	Percent Married with Husband Present	Mean Education of Husband in Years	Mean 1959 Total Income of Husband in Dollars For Women with Husbands	Mean 1959 Family Income[a] Including Weighted Husbands' Income	Mean 1959 Family Income Including One Half of Weighted Husbands' Income	N
			White[c]				
11 Years	884	76.0	10.8	5897	5366	3125	2792
12 Years	1104	76.6	12.0	6684	6224	3664	16259
13-15 Yrs.	1291	73.8	13.6	8449	7526	4409	4905
16 Years	1722	72.3	15.3	10634	9410	5566	2206
17+ Yrs.	3243	51.7	15.7	10415	8628	5935	812
			Negro[d]				
11 Years	794	60.3	9.2	3152	2695	1744	363
12 Years	978	57.0	10.5	3621	3042	2010	896
13-15 Yrs.	1151	53.7	11.1	4128	3368	2259	218
16 Years	2393	56.3	13.4	4891	5147	3770	103
17+ Years	3738	59.5	14.0	4220	6249	4994	42

[a]Earnings of woman plus total income of husband weighted for probability of marriage at each age.

[b-d]See Table 1.

TABLE 4

PRESENT VALUES AT AGE 18 OF VARIOUS MEASURES OF LIFETIME INCOME FOR WOMEN
BY RACE AND LEVEL OF EDUCATIONAL ATTAINMENT AT DISCOUNT RATES OF 0%, 5%, and 10%, IN $1,000's[a]

Years of Schooling Completed	Earnings of All Women			Earnings of Women Working Full-Time			Weighted Income of Husbands[c]			Family Income[d]			Family Income Including only Half of Husband's Income[e]		
	0%	5%	10%	0%	5%	10%	0%	5%	10%	0%	5%	10%	0%	5%	10%
							White[b]								
11 Years	44.0	14.8	7.3	132.1	50.0	26.9	213.3	77.3	38.8	257.3	92.1	46.1	150.6	53.4	26.7
12 Years	54.3	20.4	11.2	146.5	53.3	28.0	239.3	83.6	40.0	293.6	104.0	51.2	173.9	62.2	31.2
13-15 Yrs.	61.7	21.2	10.6	159.7	54.2	26.1	286.8	97.5	44.1	348.5	118.7	54.7	205.1	70.0	32.6
16 Years	81.5	25.0	11.3	181.1	59.3	27.0	339.8	108.6	45.4	421.3	133.6	56.7	251.4	79.3	34.0
17+ Yrs.	133.6	40.6	17.1	205.7	62.4	26.2	220.2	71.5	29.6	353.8	112.1	46.7	243.7	76.4	31.9
							Negro								
11 Years	41.1	14.0	6.7	81.5	31.2	16.7	90.9	32.2	16.1	132.0	46.2	22.8	86.5	30.1	14.7
12 Years	44.7	16.7	8.4	96.0	36.7	19.5	95.2	35.4	17.7	139.9	52.1	26.1	92.3	34.4	17.2
13-15 Yrs.	43.8	18.2	9.0	120.3	38.1	17.1	99.5	35.2	16.5	148.3	53.4	25.5	98.6	35.8	17.2
16 Years	127.3	37.3	15.8	159.8	50.7	22.7	121.0	43.2	19.0	248.3	80.5	34.8	197.8	58.9	24.3

[a] Calculated for females of ages 18-65 not enrolled in school at the time of the 1960 census.

[b] Excluding those with Spanish surnames.

[c] Income of husbands of women in given age and education cell weighted by the probability that women in that cell are married.

[d] Family income = earnings of all women + weighted income of husbands.

[e] Family income including only half of husbands' income = earnings of all women + ½(weighted income of husbands).

TABLE 5

INTERNAL RATES OF RETURN TO WOMEN'S EDUCATIONAL ATTAINMENT
ESTIMATED FROM HUSBANDS' INCOME

Higher Schooling Level of Comparison	Lower Schooling Level of Comparison		
	12	13-15	16
White			
13-15	17%		
16	14%	12%	
17+	negative	negative	negative
Negro			
13-15	5%		
16	12%	18%	

Negro women, incorporation of their husbands' income does not much alter the pattern established by their own earnings.

In general, the estimates of returns to education through husbands' income and family income appear less susceptible to the criticisms raised earlier about estimates of returns through women's earnings, in terms of magnitude, stability, and so forth.

III

What are some implications of these results? Are they in accordance with what we observe happening? Where the implications of the various returns of results differ, which appear to be more consistent with observed phenomena?

First consider the area of undergraduate education for women. The returns through women's earnings and husbands' and family income all suggest that college education for women was an attractive alternative in 1960. The family incomes measures showed a particularly high return.

The rapid growth in the number of women in higher education over the decade 1960-69 is consistent with these results. There was an increase in the absolute number of women in college, an increase in the proportion of high school female graduates attending college, and for whites a rapid increase in the ratio of female to male college students. Without estimates of family income by level of women's education for earlier years, it is not clear that the estimates for 1959 represented higher than normal returns. Unfortunately, such information for earlier years is very difficult to obtain. There is some information available for 1950 and 1960 on the proportion of women who were married by level of educational attainment. (Table 6.) The likelihood of marriage was lower for women with college training in 1950 than in 1960. Consequently, if husbands' income differentials across wives'

TABLE 6

PERCENTAGE OF WOMEN OF AGES 30-34 WHO WERE MARRIED WITH HUSBAND PRESENT, BY LEVEL OF EDUCATIONAL ATTAINMENT, in 1950 and 1960.

Year	Years of Education Completed by Woman		
	12	13 - 15	16 or more
1950[a]	14.3	82.2	75.25
1960[b]	86.5	85.4	82.6

[a]Source: United States Bureau of the Census, U. S. Census of Population, 1950, Volume IV, Special Reports, Part 5, Chapter B, Education, p. 63.

[b]Source: 1/1000 Census File for 1960. See pp. XV-XXIV in Supplementing Appendix. Ages here are 31 to 35.

educational levels were no lower in 1950 than in 1960, expected family returns to women's college education were lower in 1950.

A second area to consider is that of graduate education for women. The returns to this training as measured through women's earnings appear much higher than the returns measured through family income, which appeared to be quite low in 1960. In fact, while the ratio of female to male B.A. recipients increased from 1960 to 1964 (from .54 to .68), the ratio of female to male M.A. recipients stayed approximately the same, as did the ratio of female to male Ph.D. recipients (from .117 in 1960 to .121 in 1964).[1] These results lend some weak support to the family income maximization hypothesis for women.

In a third, slightly different context, some of the implications of these various measures of returns can be pursued by comparing the returns to education in terms of own earnings, husbands' income, and family income for registered nurses and for women with a general college education, and examining the growth rate of female entrants into nursing training and general college programs. Table 7 shows the returns for nurses and nonnurses with comparable years of education and the growth rates of entrants into nursing schools and colleges during the 1960's. Nursing looks reasonably attractive when women's earnings streams alone are considered, but quite unattractive when the expected husbands' and family incomes are considered. The low growth rate of students entering nursing programs is consistent with these latter rates of return. Although many other factors influenced these flows of students,[2] the returns through family income are consistent with the

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[1] See Table 1.3 in the appendix.

[2] See Lee Benham, "An Economic Analysis of the Labor Market for Registered Nurses," (unpublished Ph.D. dissertation, Department of Economics, Stanford University, 1970).

TABLE 7

PRESENT VALUE AT AGE 18 OF VARIOUS MEASURES OF LIFETIME INCOME FOR WOMEN AT DISCOUNT RATES OF 0%, 5%, AND 10%, IN $1,000s[a]

Years of Schooling Completed	Earnings of All Women			Earnings of Women Working Full-time			Weighted Income of Husbands[b]			Family Income[c]			Annual Rate of Increase in New Entrants During 1958-1960
	0%	5%	10%	0%	5%	10%	0%	5%	10%	0%	5%	10%	
Registered Nurses													
13-15 years	103.8	35.0	17.4	171.6	59.7	29.3	170.5	66.9	32.8	274.3	101.9	50.2	1.3%[d]
13-16 years	105.8	35.0	16.9	171.5	57.7	27.2	171.0	66.0	32.7	276.8	101.9	49.6	3.4%[e]
All Women Except Registered Nurses													
12 years	53.4	20.2	11.2	155.6	56.9	30.0	238.4	83.2	39.8	293.1	103.7	51.1	10.8%[f]
13-15 years	59.1	20.2	10.1	170.0	58.1	28.2	291.8	99.1	44.7	352.0	119.5	55.0	12.0%[g]
13-16 years	65.6	21.7	10.5	175.7	60.1	29.0	309.8	103.4	45.8	375.4	125.1	56.3	12.0%[g]
16 years	80.4	24.6	11.1	186.8	62.9	29.3	343.9	109.5	45.6	424.5	134.2	56.8	12.0%[g]

[a] Calculated from data for females, excluding Negroes, of age 18 and over, not enrolled in school at the time of the 1960 Census. From 1/1000 sample of Census 1960.

[b] Income of husbands in each women's age, occupation, and education cell weighted by the probability that women in that cell are married.

[c] Income of all women and weighted income of husbands.

[d] For new entrants into diploma nursing programs.

[e] For new entrants into all nursing programs.

[f] For female graduations from high school.

[g] For new female entrants into college.

occupational choice trend shown here while the returns through own earnings are not. Furthermore, other studies have found that nurses do not appear to respond in the expected manner to changes in rates of return on earnings.[1]

These results, fragmentary as they are, suggest that a family income maximization model may be useful in further examinations of the demand for education by women. They also suggest that estimates of returns to education calculated from women's earnings should be interpreted with caution, particularly in drawing inferences about resource allocation in the labor market for women or about women's behavioral responses to different rates of return. Women appear to receive substantial returns from higher education, but not directly through their own earnings. As a consequence, we should not be surprised to find that the supply response of women to changing pecuniary returns on earnings may be weak (at least for whites). Shortages and surpluses as conventionally defined by economists may persist over long periods of time.

IV

While a strong relationship between women's education and family income has been found, the reasons for the higher family income are not entirely clear. Husbands' earnings may be higher on average as women increase their education either because they marry more productive men or because the men become more productive as a consequence of marrying women with more education. There are several issues for which it would be useful to separate out the effects of selectivity from contributions to market productivity by the women.

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[1]See Donald E. Yett, "Lifetime Earnings for Nurses in Comparison with College Trained Women." Inquiry, V (December, 1968), 35-70, and "Causes and Consequences of Salary Differences in Nursing," Inquiry, VII (March, 1970), 78-99.

If these higher family returns are due largely to selectivity on the part of the woman, then the social pecuniary returns to women's education will be less than if their education is reflected in raising the productivity of the men they marry.

The distinction between selectivity and productivity also becomes relevant from the standpoint of understanding the marriage market and the process of mate selection. The returns to marriage for the man and woman will depend in part upon the complementarity of their inputs in the production of "commodities" in the home. The related issue of the complementarity of husbands' and wives' education in terms of each of their market activities is raised here. It does not seem unreasonable that a woman's education would be in part reflected in her husband's earnings, independent of his own level of educational attainment and other characteristisc. However, to establish the net contribution of the woman's education is not an easy task. Many of the problems are similar to those which arise in attempts to separate the effects of ability and education on earnings. No claim is made that these problems are solved here. Nevertheless, it appears useful to obtain some rough estimates of the changes in earnings which are associated with changes in education of members of the family.

Two estimates were made. In the first, earnings and wage rates were calculated from the 1/1000 sample of the 1960 Census for men and women in families in which husband and wife each had either 12 or 16 years of education. (Table 8.) The earnings and wage rate of husbands at both levels of education increase as the wife's education increases from 12 to 16 years. The earnings per hour of women increase in one case (12 years) and decrease in the other (16 years) as husband's education increases.

Several demographic characteristics were accounted for in the second estimates. (Table 9.) Again the incomes of men rise with their own education

TABLE 8

CHARACTERISTICS OF HUSBANDS AND WIVES, AGE 18 AND OVER, WHITE, MARRIED WITH SPOUSE PRESENT

Years of Education Completed by Husband		Years of Education Completed by Wife: 12		16	
		Husband	Wife	Husband	Wife
12	Earnings	5998	832	6984	1571
	Other Income	483	108	754	
	Wage Rage	2.80	1.54	3.18	2.38
	% Employed Last Year	.98	.42	.98	.54
	Hours Last Week	45.5	36.5	45.8	34.7
	Weeks Last Year	49.0	35.9	49.8	36.2
	Earnings Age 41-50	6855		7745	
	N	4989	5011	240	239
16	Earnings	8419	657	9763	938
	Other Income	1039	197	1782	
	Wage Rate	3.97	1.84	4.57	2.29
	% Employed Last Year	.95	.31	.97	.39
	Hours Last Week	45.0	34.2	45.4	33.2
	Weeks Last Year	49.7	34.7	48.8	31.9
	Earnings Age 41-50	10392		12211	
	N	771	780	493	511

TABLE 9

MEAN ANNUAL INCOME OF HUSBAND BY EDUCATION OF HUSBAND AND WIFE FOR WOMEN AT AGE 40[a]

Years of Education Completed by Husband	Years of Education Completed by Wife				
	11	12	13-15	16	17
< 11	6548 (46.6%)[b]	6614 (30.5%)	8530 (18.5%)	7325 (5.6%)	6075 (8.2%)
11	7431 (16.8%)	6883 (7.0%)	10828 (3.8%)	6748 (1.2%)	3542 (2.0%)
12	7526 (25.6%)	7716 (40.0%)	10379 (24.8%)	12186 (19.5%)	5728 (9.7%)
13	8539 (2.4%)	8599 (5.3%)	11159 (7.5%)	12516 (4.3%)	10743 (2.6%)
14-15	9819 (4.5%)	9703 (7.7%)	12004 (15.7%)	13413 (10.2%)	9598 (10%)
16	14869 (1.9%)	10250 (6.3%)	14739 (14.0%)	16840 (29.7%)	14402 (12%)
17+	17616 (2.1%)	12370 (3.3%)	15981 (15.7%)	17468 (29.4%)	14944 (56%)
N	779	5536	1488	656	196
Mean Unadjusted Income of Husband	6813	7438	9710	12258	11212

Footnotes to Table 9

[a]These incomes were estimated using the 1/1,000 Census sample for 1960. Five subsamples were taken, one for each education level, 11, 12, 13-15, 16, 17+, of white females of ages 30-50, living outside the south and married with husband present. Then for each of these subsamples, the coefficients of a simple linear equation were estimated by ordinary least squares. The dependent variable was total income of husband in 1959. The independent variables were: city size of residence, age, age at first marriage, whether foreign born or not, whether born in the south or not, whether born in the state currently residing in or not, and education of the associated person. The estimates of husbands' incomes were calculated using this equation. See appendix for a more complete discussion.

[b]Percent of women with this level of education who have husbands with this level of education.

and with the education of their wives. The magnitude of the increase is more dramatic here. For several categories containing substantial parts of the total population, the income of men increases more dramatically with wives' education, holding husbands' education constant, than it does with husbands' education, holding wives' education constant. For women with 12 years of education with husbands with 12 years of education, husbands' mean income is $7,716. When the man's education is 16 years and the wife's is 12, his mean income is $10,250. When her education is 16 years and his is 12, his mean income is $12,186. When both have 16 years of education, his mean income is $16,840. Other combinations can be examined in the table. In general, some undergraduate college education for the woman is associated with a substantially higher income of her husband.[1] Graduate training for women appears to be associated with lower husbands' income.[2]

While there are differences between the magnitude of the estimates obtained they both suggest a substantial association between women's education and husbands' earnings. However, the extent to which the differences in earnings are due to selectivity and increase productivity is uncertain. A male with only a high school education who marries a female college graduate is likely to differ from the average high school graduate even before marriage. Devising tests to estimate the separate impact of these two effects, however, is not a simple matter. In one test, the relationship

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[1]The aberrant cases generally involve a small sample size. This same pattern was found in several other estimates of the partial effect of women's education on husbands' earnings.

[2]There is presumably some simultaneous equations bias here: women's education may be initiated or continued after marriage in part as a function of the earnings and education of the husband. There is weak evidence that, ceteris paribus, the later the age of marriage, the lower the husband's income. See Appendix I, Table 1.2 variables AGEM17-AGEM26.

between age of women at first marriage and the association between husband's earnings and wife's education was examined. If partner selectivity was the primary explanation for the results in Tables 8 and 9, then for any given combination of husbands' and wives' education, the husbands of women who married during college should have higher earnings than the husbands of women who married before they went to college. Several estimates were made; in no case were there significant differences between husbands' earnings for those women who married in college and those who married before or after (except for those women who married after age 26). This would suggest that women's education per se affects male earnings. However, this test is crude, and it is not difficult to think of alternative explanations for these age-at-marriage results. Further work will be required before we can make any confident assertions about the relative magnitudes of these two effects. Nevertheless, if only a portion of the differences in husbands' income observed here can be attributed to women's productivity, as distinguished from their selectivity of marriage partners, this has important implications for the social returns to education for women and the incentives to marry well-educated partners.

APPENDIX I

The following procedure was used to obtain estimates of husband's income presented in Table 4. The data is from the 1/1,000 census sample file for 1960. Five subsamples were selected, one for each level of education attainment by the woman, 11 years, 12, 13-51, 17, and 17+. These samples included white females (excluding those with Spanish surname), living outside the south, age 30-50, married with spouse present, not at school. The income of husbands was estimated as a function of the husbands' education and characteristics of the wives for each subsample. The coefficients were estimated using ordinary least squares.

The variables names and definitions are given below. To estimate average incomes at age forty, the following assumptions were made: all women lived in cities of population 100,000 were never divorced, were married at age 20, or 21, were 40 years of age, were born outside the south, were not foreign born, lived in the same location for seven years, and were born in the same state. Alternative assumptions can be used to calculate estimates with these coefficients.

TABLE 1.1

DESCRIPTION OF VARIABLES USED IN REGRESSION EQUATIONS TO ESTIMATE HUSBANDS INCOME

Variable Name	Variable Number	Census Tape Variable Number	Description of Variables	Recode
SIZPL	1	#3	Size of Place Recode variable to log of midpoints	=log 10 1250 if #3=1-3 =10g 10 2,000,000 if #3=12
RCENM	2	#4, #5	Residence in Central City of SMSA	=1 if #4≠ 1 & #5=5-8 =0 otherwise
RURBM	3	#4, #5	Outside of Central City in SMSA	=1 if #4≠ 1 & #5=9-12 =0 otherwise
RURBN	4	#4, #5	Rural in SMSA	=1 if #4=1 & #5≠ 1-2 =0 otherwise
RRNFN	5	#4, #5	Rural nonfarm, outside SMSA	=1 if #4=1 & #5=2 =0 otherwise
RRFN	6	#4, #5	Outside place, outside SMSA	=1 if #4=1 & #5=1 =0 otherwise
MARST	7	#10	Marital status, married more than once	=1 if yes =0 otherwise
AGEM17	8	#6, #8, #9	Age at first marriage	=1 if 17 years or under =0 otherwise
AGEM18	9	#6, #8, #9	" " " "	=1 if 18 or 19 years =0 otherwise
AGEM20	10	#6, #8, #9	" " " "	=1 if 20 or 21 years =0 otherwise
AGE22	11	#6, #8, #9	" " " "	=1 if 22 or 23 years =0 otherwise
AGE24	12	#6, #8, #9	" " " "	=1 if 24 or 25 years =0 otherwise
AGE26	13	#6, #8, #9	" " " "	=1 if 26 years or over =0 otherwise

TABLE 1.1

DESCRIPTION OF VARIABLES USED IN REGRESSION EQUATIONS TO ESTIMATE HUSBANDS INCOME

Variable Name	Variable Number	Census Tape Variable Number	Description of Variables	Recode
AGEL1	14	#6	Age of person = 30-34	=1 if yes =0 otherwise
AGEL2	15	#6	" " " = 35-39	=1 if yes =0 otherwise
AGEL3	16	#6	" " " = 40-44	=1 if yes =0 otherwise
AGEL4	17	#6	" " " = 45-50	=1 if yes =0 otherwise
AGE	18	#6	Age of person in years	
FREIGN	19	#15	Foreign Born	=1 if yes =0 otherwise
SOBORN	20	#16	Born in South	=1 if yes =0 otherwise
TIMIN	21	#23	Length of time in same place in years	01-05 = 01-05 06 = 8 07 = 15 08 = 25 09 = 25
SAMST	22	#25	Residence in same state as 1955	=1 if yes, #25=1-5 =0 otherwise
EDAS10	23	#75	Highest grade completed by husband=10 years or less	=1 if #75 < 7 =0 otherwise
EDAS11	24	#75	Highest grade completed by husband=11 years	=1 if #75=7 =0 otherwise
EDAS12	25	#75	Highest grade completed by husband=12 years	=1 if #75=8 =0 otherwise
EDAS13	26	#75	Highest grade completed by husband=13 years	=1 if #75=9 =0 otherwise
EDAS14	27	#75	Highest grade completed by husband=14-15 years	=1 if #75=10 =0 otherwise

TABLE 1.1

DESCRIPTION OF VARIABLES USED IN REGRESSION EQUATIONS TO ESTIMATE HUSBANDS INCOME

Variable Name	Variable Number	Census Tape Variable Number	Description of Variables	Recode
EDAS16	28	#75	Highest grade completed by husband = 16 years	=1 if #75=11 =0 otherwise
EDAS18	29	#75	Highest grade completed by husband = 18 years	=1 if #75=12 =0 otherwise
CHLDRN	30	#37	Number of children ever born	
ASCINC	31	#82	Total income of husband in 1959	
TOTINC	32	#111	Total income of person in 1959	
ERNINC	33	#110, #111	Total earnings of person in 1959, self employment plus wage and salary income	
FAMINC	34	#112	Total family income in 1959	

TABLE 1.2

REGRESSION EQUATIONS:

White Females Excluding Those with Spanish Surname, Age 30-50, Not in School, Married with Spouse Present, Living Outside South. Dependent Variable is the Income of Husband.

	(Level of Educational Attainment of Woman)				
	11	12	13-15	16	17+
CONST	544.99	605.23	3684.2	-14010.0*	-12680.0
SIZEPL	64.16	8.2764	172.63	72.089	1132.9*
RURBM	1295.3**	828.07**	1695.4**	1921.0*	2196.0*
RURBN	-554.68	-826.46**	-1822.0	2870.8**	-1209.7
RRNFN	-1749.9*	-2307.9**	-114.06	-933.00	-8618.1
RRFN	-1435.6*	-1196.4**	-2563.7	-3103.8*	3853.9*
MARST	-370.81	-775.15**	-711.13	-2664.5*	3428.2*
AGEM17	107.42	-14.973	-487.09	457.1	135.90
AGEM18	-881.01*	50.824	-363.96	974.26	-3222.4
AGEM22	-1442.9*	-195.23	-422.39	-455.38	-3369.5*
AGEM24	-726.2	-152.72	-1276.0*	-1904.3*	-3907.0*
AGEM26	-1792.6**	-1039.0**	-2267.3**	-3364.9**	-5412.0*
AGEL2	-859.56*	-193.28	1021.9*	-1913.3*	-1222.5
AGEL3	-870.4	-628.77*	1979.0*	-894.04	-2619.8
AGEL4	-1718.9	-1436.9*	853.25	-3521.1	-708.36
AGE	190.2*	183.1**	80.595	608.85**	327.24
FREIGN	294.68	-23.96	-2133.7*	1187.9	-3459.9*
SOBORN	-1178.3*	471.22*	543.56	3308.4**	3808.9*
TIMIN	-69.887**	-44.58**	10.49	18.334	136.58
SAMEST	484.9	696.34**	751.41*	2316.2*	2556.3*
EDASIO	-978.46**	-1102.8**	-1849.9**	-4862.0**	347.81
EDASI1	-95.797	-832.69**	449.09	-5217.4*	-2186.1
EDASI3	1013.5	882.73**	779.91	132.82	5015.7
EDASI4	2293.8**	1986.7**	1624.9**	1408.4	3870.5*
EDASI6	7342.9**	3025.3**	4360.3**	4762.4**	8674.3**
EDASI8	10090**	5236.5**	5601.6**	5440.3**	9216.9**
N=	779	5535	1488	656	196
R^2	.16	.087	.126	.164	.194

* t ratio > 1.0

** t ratio > 2.0

Table 1.3* -Earned degrees conferred, by level, institutional control, and sex: Aggregate United States, 1947-48 through 1964-65

Level and year	Total			Public			Private		
	Men and Women	Men	Women	Total	Men	Women	Total	Men	Women
1	2	3	4	5	6	7	8	9	10
Bachelor's and first-professional degrees									
1964-65 total	538,930	319,670	219,260	307,131	177,645	129,486	231,799	142,025	89,774
Bachelor's (requiring 4 but less than 5 years)	492,984	279,777	213,207	289,020	161,723	127,297	203,964	118,054	85,910
First-professional requiring 5 or more years	45,946	39,893	6,053	18,111	15,922	2,189	27,835	23,971	3,864
1963-64 total	502,104	299,813	202,291	281,694	163,691	118,003	220,410	136,122	84,288
Bachelor's (requiring 4 but less than 5 years)	460,467	263,121	197,346	265,821	149,534	116,287	194,646	113,587	81,059
First-professional requiring 5 or more years	41,637	36,692	4,945	15,873	14,157	1,716	25,764	22,535	3,229
1962-63 total	450,592	274,750	175,842	247,624	146,938	100,686	202,968	127,812	75,156
Bachelor's (requiring 4 but less than 5 years)	410,423	239,108	171,315	232,595	133,594	99,001	177,826	105,514	72,312
First-professional requiring 5 or more years	40,172	35,642	4,529	15,029	13,344	1,685	25,142	22,298	2,844
1961-62 total	420,485	262,015	158,470	229,387	139,672	89,715	191,098	122,343	68,755
Bachelor's (requiring 4 but less than 5 years)	382,822	228,445	154,377	216,148	127,729	88,419	166,674	100,716	65,958
First-professional requiring 5 or more years	37,663	33,570	4,093	13,239	11,943	1,296	24,424	21,627	2,797
1960-61 total	401,784	255,900	145,884	218,060	136,061	81,997	183,724	119,837	63,887
Bachelor's (requiring 4 but less than 5 years)	365,337	223,427	141,910	205,214	124,476	80,738	160,123	96,951	61,172
First-professional requiring 5 or more years	36,447	32,473	3,974	12,846	11,587	1,259	23,601	20,886	2,715
1959-60	394,889	255,504	139,385	214,720	136,504	78,216	180,169	119,000	61,169
1958-59	385,151	254,866	130,283	210,584	136,808	73,776	174,567	118,060	56,507
1957-58	365,748	242,948	122,800	198,731	129,585	69,146	167,017	113,363	53,654
1956-57	340,347	222,738	117,609	181,030	115,306	65,722	159,317	107,430	51,887
1955-56	311,298	199,571	111,727	162,237	100,127	62,110	149,061	99,434	49,617
1954-55	287,401	183,602	103,799	147,404	89,246	58,158	139,997	94,356	45,641
1953-54	292,850	187,500	105,350	148,330	89,941	58,389	144,550	97,559	46,991
1952-53	304,857	200,820	104,037	155,639	97,386	58,223	149,248	103,434	45,814
1951-52	331,924	227,029	104,695	163,856	107,149	56,707	168,068	119,880	48,188
1950-51	384,352	279,343	105,009	193,845	137,668	56,177	190,507	141,675	48,832
1949-50	433,734	329,819	103,915	217,359	162,754	54,655	216,345	167,065	49,280
1948-49	366,695	264,222	102,476	180,628	127,252	53,376	185,870	136,970	48,900
1947-48	272,511	176,146	96,165	136,180	86,829	49,351	136,131	89,317	46,814
Master's degrees									
1964-65	112,195	76,211	35,984	68,199	46,477	21,722	43,996	29,734	14,262
1963-64	101,122	69,012	32,110	62,563	42,710	19,853	38,759	26,302	12,457
1962-63	91,415	62,944	28,474	54,942	37,945	16,997	36,476	24,999	11,477
1961-62	84,869	56,705	26,164	50,663	35,194	15,469	34,226	23,511	10,715
1960-61	78,269	53,158	24,111	46,244	32,116	14,126	32,025	22,042	9,983
1959-60	74,497	50,937	23,560	42,991	29,324	13,667	31,506	21,613	9,893
1958-59	69,584	47,408	22,176	40,403	27,560	12,843	29,181	19,848	9,333
1957-58	65,614	44,252	21,362	37,954	25,695	12,259	27,660	18,557	9,103
1956-57	61,955	41,352	20,623	35,161	23,449	11,712	26,794	17,903	8,911
1955-56	59,294	38,397	19,897	33,095	21,874	11,221	26,199	17,523	8,676
1954-55	58,204	38,740	19,464	32,291	21,416	10,875	25,913	17,324	8,589
1953-54	56,823	38,147	18,676	30,701	20,578	10,123	26,122	17,569	8,553
1952-53	61,023	40,989	20,034	31,113	21,082	10,031	29,910	19,907	10,003
1951-52	63,587	43,591	19,996	31,527	21,867	9,660	32,060	21,724	10,336
1950-51	65,132	46,231	18,901	31,472	22,932	8,540	33,660	23,299	10,361
1949-50	58,219	41,237	16,982	26,192	18,998	7,194	32,027	22,239	9,788
1948-49	50,763	35,224	15,539	21,056	15,028	6,028	29,707	20,196	9,511
1947-48	42,449	28,939	13,510	17,696	12,892	4,804	24,753	16,047	8,706
Doctor's Degrees									
1964-65	16,467	14,692	1,775	9,472	8,623	849	6,995	6,069	926
1963-64	14,490	12,955	1,535	8,194	7,453	741	6,296	5,502	794
1962-63	12,822	11,448	1,374	7,084	6,512	572	5,738	4,936	802
1961-62	11,622	10,377	1,245	6,296	5,745	555	5,326	4,634	692
1960-61	10,575	9,463	1,112	5,584	5,126	458	4,991	4,337	654
1959-60	9,629	8,601	1,028	5,096	4,635	463	4,731	4,166	565
1958-59	9,563	8,571	989	4,850	4,438	412	4,510	3,913	577
1957-58	8,942	7,978	964	4,614	4,173	441	4,326	3,805	525
1956-57	8,756	7,817	939	4,484	4,088	396	4,272	3,729	543
1955-56	8,903	8,018	885	4,563	4,169	414	4,320	3,849	471
1954-55	8,840	8,014	826	4,560	4,188	372	4,280	3,826	454
1953-54	8,996	8,181	815	4,656	4,339	317	4,340	3,842	498
1952-53	8,309	7,517	792	4,127	3,799	328	4,182	3,716	466
1951-52	7,648	6,969	714	3,469	3,195	274	4,214	3,774	440
1950-51	7,338	6,664	674	3,043	2,834	209	4,295	3,830	465
1949-50	6,470	5,854	616	2,669	2,459	210	3,752	3,346	406
1948-49	5,850	5,328	522	1,936	1,814	162	3,914	3,514	400
1947-48	5,989	5,496	493	1,580	1,435	145	4,409	4,061	348

*Department of Health, Education and Welfare, Office of Education: Annual Report "Earned Degrees Conferred 1964-65", p. 4.