DOCUMENT RESUME

ED 224 438 HE 015 771

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TITLE Does College Pay? Wage Rates before and after Leaving School. NCES Bulletin.
INSTITUTION National Center for Education Statistics (ED), Washington, DC.
REPORT NO NCES-82-238b
PUB DATE Nov 82
NOTE 13p.
AVAILABLE FROM National Center for Education Statistics, 400 Maryland Ave., S.W., Washington, DC 20202.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Associate Degrees; Bachelors Degrees; College Attendance; *College Graduates; Comparative Analysis; *Educational Attainment; *Education Work Relationship; Females; Higher Education; *High School Graduates; Longitudinal Studies; Males; Salaries; *Salary Wage Differentials; *Sex Differences
IDENTIFIERS *National Longitudinal Study High School Class 1972

ABSTRACT

The relationship between starting wage rates and level of education attained by young adults was studied, based on findings of the National Longitudinal Study of the High School Class of 1972. According to 1972-1979 data, the greater the educational attainment of the young adults, the higher their starting wage rates. Although the wage rates of young women college graduates quickly caught up to and overtook those of their female high school classmates who did not attend college, the wage rates of young men who did not attend college remained higher than their college-educated classmates for at least 8 years after high school. However, within every educational level and age group, females earned less per hour than comparable males. While in school, young people worked for lower hourly pay than they could get were they not in school. The women studied showed a crossover point (when the wage rates of those with differing levels of educational attainment show only minimal differences) in wage rates in 1976, when most of them were 22 years old. In that year, the wage rate of women with no college was $4.27 per hour, of those with less than 2 years of college was $4.61 per hour, of those with 2 years of college or more or a two-year degree was $4.54, and of those with a bachelor's or advanced degree was $4.72 per hour. For men, the crossover point in earnings came in 1979, when most were 25 years old, when the median hourly wage rates of men were $7.06, $6.94, $6.50, and $6.88, respectively. Limitations of the data are considered. (SW)

National Center for Education Statistics Bulletin
U.S. DEPARTMENT OF EDUCATION
Office of the Assistant Secretary for Educational Research and Improvement

November, 1982

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Does College Pay? Wage Rates Before and After Leaving School

The greater the educational attainment of young men and women, the higher their starting wage rates, according to career-data collected from 1972 to 1979 by the National Center for Education Statistics (NCES). Young men and women of all educational levels receive wage rate increases when they leave school, though some increases are larger than others. After graduating from college, the wage rates of young women quickly catch up to and overtake those of their female high school classmates who did not attend college. In contrast, the wage rates of young men who did not attend college remain higher than their college-educated classmates for at least eight years after high school. However, within every educational level and age group, young women earned less per hour than comparable young men.

These are some of the findings of the National Longitudinal Study of the High School Class of 1972 (NLS 72), the Center's first study to follow the progress of young people as they move from high school to take on adult roles. The NLS-72 sample of 23,451 young adults represents the twelfth grade U.S. population in 1972. Questionnaires fielded in 1972 and in four followup surveys (the last in 1979) asked, among other things, about educational attainments and labor market experiences over the 7 years since 1972. NLS-72 data provide an overview of the wages of young adults as they pass through and leave the Nation's school systems.

For many young people and their families, an important motivation for furthering their education is the improved chances for promotion and salary increases. The increased productive capacity of educated persons is also an important reason, though not the only one, for the existence of public and private student financial aid programs.[1] Economic research on human capital has portrayed the distribution of earnings by age and educational qualifications,[2] but empirical work in this area has focused on the mid-life years, after the transition from school to work. This bulletin graphically portrays several aspects of the careers of young men and women who make different choices about their education: the reduced earnings capacity of those in college, the crossover point when the wages of the college educated catch up to those with no higher education, and the wage increases that come with age and experience after leaving high school or college.

The Crossover Point in Wage Rates

Students who work while in school generally take part-time jobs that pay less per hour than they could earn had they chosen to leave school and work full time. After leaving high school or college, the wage rates of those with more education catch up to and, after a few years, overtake those with less education. The career patterns of earnings by educational level are generally quite similar for young men and women, however, women earn less than men at each age and educational level. For example, young men with high school diplomas but no college start at much higher wage rates than young women of the same educational level (a median hourly wage rate[3] of $4.71 compared to $3.76). Young men and women also differ in the length of time it takes for those with college degrees to catch up to their non college peers.

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1 See Mark Blaug, 1972, "Cost-Benefit Analysis the Social Calculus," Chapter 7 in *An Introduction to the Economics of Education, Baltimore Penguin Books.*

2 See, for example, Gary S. Becker, 1964, *Human Capital A Theoretical and Empirical Analysis, With Special Reference to Education* [2nd ed., 1975] New York: National Bureau of Economic Research, Inc.

3 All wage rates in this bulletin are medians, reported in constant 1980 dollars.

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For women, the crossover point -- when the wage rates of those with differing levels of educational attainment show only minimal differences -- occurs very soon after college graduation. The women in the NLS-72 cohort showed a crossover point in wage rates in 1976 when most of them were 22 years old. In that year, the wage rate of women with no college was $4.27 per hour, of those with less than 2 years of college was $4.61 per hour, of those with 2 years of college or more or a 2-year degree was $4.54, and of those with a bachelor's or advanced degree was $4.72 per hour.

For men, the crossover point in earnings comes later. The men of the NLS-72 cohort showed a possible crossover point in 1979 when most of them were 25 years old. In that year, the median hourly wage rate of men with no college was $7.06 per hour, of those with less than 2 years of college was $6.94 per hour, of those with 2 years of college or more or a 2-year degree was $6.50, and of those with a bachelor's degree or more was $6.88. Data from 1980 and later years are needed to be sure that 1979 was definitely the crossover year.

The wage differences among young men at the crossover point are very small, as are the wage differences among young women. In order to place these wage differences in the proper context, it is instructive to examine the time path of wage rates for men and women in the different educational groups. Figure 1 displays the median hourly wage rates of the NLS-72 cohort members who were working each year from 1972 to 1979, as they grew from 18 to 25 years old. For both men and women, those who went to college earned lower wages in the early years than did those of the same sex who did not go to college. But after age 21, when most young people finish college, the wage rates of those who earned bachelor's or advanced degrees grew faster than did the rates of those of the same sex with less college education. While the wage rates of those who did not go to college also grew steadily with age, this growth was not rapid enough to keep them ahead of the bachelor's degree holders after age 25.

The age-wage profiles in figure 1 show a noticeably different pattern for young men and women, in that the wage rates of those men with college degrees at age 25 had not yet clearly surpassed those of their male cohort who had not attended college. In contrast, the college-educated women had clearly surpassed by age 23 those of their female cohort who had not attended college. The source of this difference seems to lie with the non college group, because the college bound men and women show quite similar profiles. The non-college men start out earning more ($4.63 per hour at age 18) than either the non-college women ($3.73 per hour) or the bachelor's degree bound men ($3.77 per hour). In addition, the non college men increased their hourly wage rate by about 35 cents per hour each year over the next 7 years, while the non college women increased their hourly earnings only 12 cents per hour per year during the same period.

The Transition from School to Work

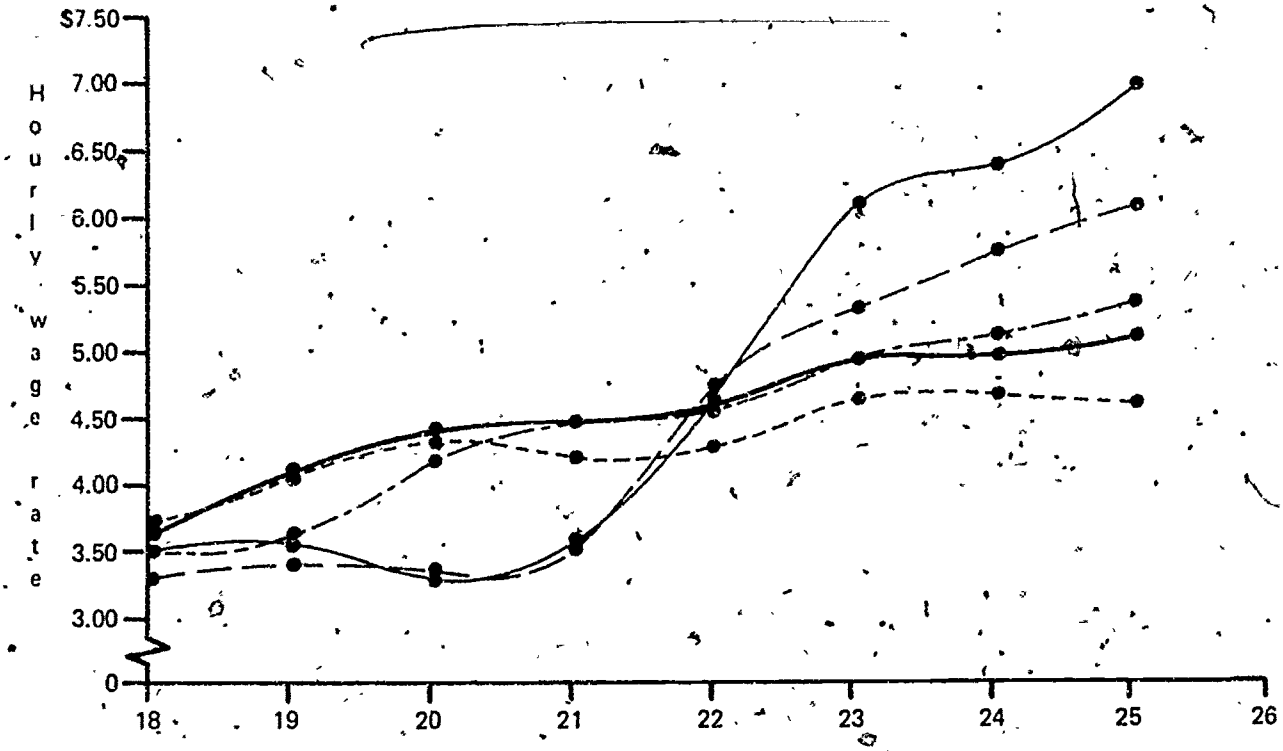
The above interpretation of the age-wage profiles in figure 1 relies on the standard pattern of school attendance full time school for the required number of years, followed by full-time work. But a number of young men and women fail to follow this standard pattern. They may enter college late, drop out and return, attend part time, or fail to make sufficient academic progress to graduate with their classmates. For example, while the average time of leaving school for all NLS-72 young men was the spring of 1975, the standard deviation of this average was about 22 months, indicating that about two-thirds of these men left school (completed or not) between the fall of 1973 and the fall of 1976. The age-wage profiles in figure 1 mix together different proportions of students and non-students in calculating the median hourly wages at each age.

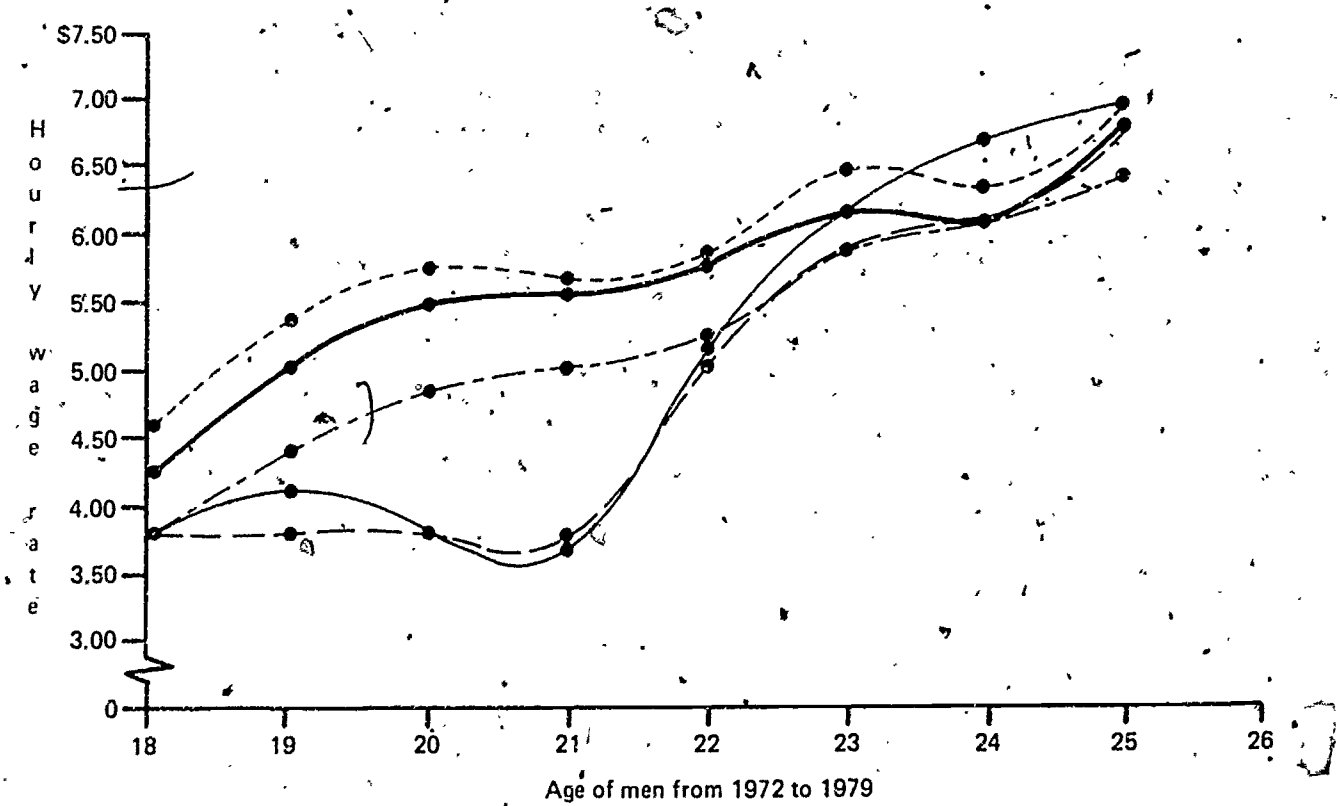
The wage rates of students and non-students have been separated in figure 2 by changing the definition of the horizontal axis from age to the number of years before or since leaving school. In these profiles, the zero point on the horizontal axis is the individual's last year in school, the positive numbers are the number of years since the person left school, and the negative numbers are the number of years left before the person will leave school (known with the hindsight of NLS-72 career data).

The increase in wage rates that occurs upon leaving school is clearly apparent in figure 2. For both men and women, those who enrolled in higher education received higher wage rates when they left school, and the greater their educational attainment, the larger their starting wage rate. While the career patterns of wage rates by educational level are quite similar, women earn less than men at each point in their careers. For men, the starting wage rate of those with no college was $4.71 per hour; with less than 2 years of college, $5.13; with 2 years of college or more or a 2 year degree, $5.56; with a bachelor's degree, $5.96; and with an advanced degree, $6.98. For women, the corresponding starting wage rates were $3.76, $4.13, $4.54, $5.24, and $6.60, respectively. These wage comparisons show that the earnings gap between the sexes is reduced at higher levels of education. Other research in the economics of education[4] has shown (using cross sectional, rather than

[4] Giora Hanoch, 1967, "An economic analysis of earnings and schooling," *Journal of Human Resources* 2(Fall): 310-329

Figure 1. Median wages, by age for 1972 high school seniors with various 1979 educational attainments

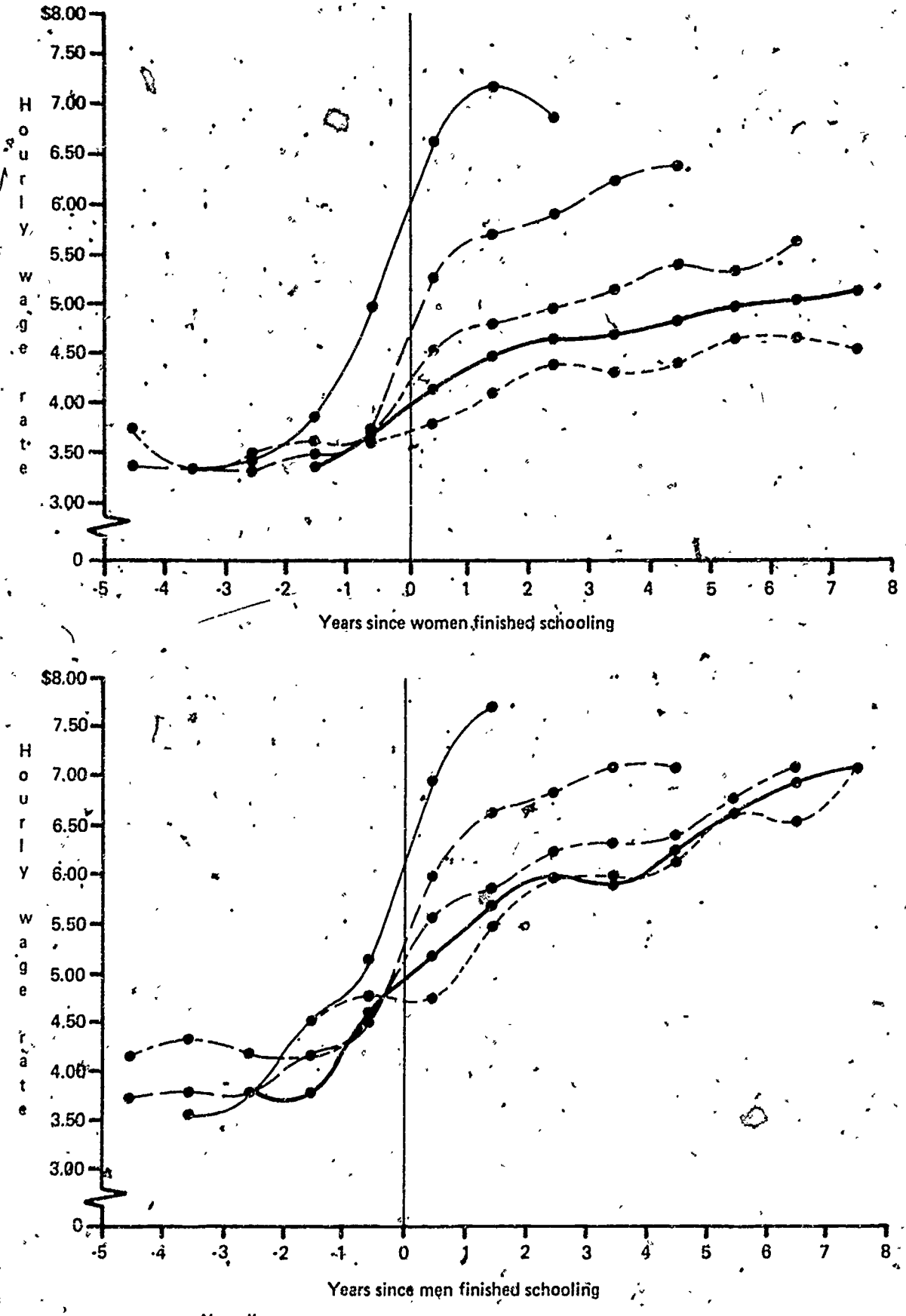




- - - - - - No college
——— Less than 2 years college
— — — 2 years college or more
—.—.— Bachelor degree
——— Advanced degree

Sources: Tables 1 and 2.

Figure 2. Median wages before and after leaving higher education for 1972 high school seniors with various 1979 educational attainments



Sources: Tables 3 and 4.

longitudinal data) that the wage rates of the more educated adults grow faster than those of the less educated after they leave school. However, the observed portion of the careers of the NLS 72 cohort members, especially those who went to college, is too short to make such an assessment.

Conclusion

The wage histories of 1972 high school seniors from all over the United States demonstrate the dynamic nature of the relationship between schooling and wage rates. While in school, young people work for lower hourly pay than they could get were they not in school, when they leave high school or college, their starting wage rate is higher the more schooling they have completed. Promotions and wage increases come to young people over a fairly long period of time as a result of both work experience and educational achievement. The NLS 72 data show the advantages of work experience for men, it takes several years for the wage rates of college-educated men to equal the wage rates of men who did not go to college. The advantages of work experience are less for women, the wage rates of college educated women surpass those of their non-college peers shortly after graduation. Both schooling and experience are insufficient to close the gap in wage rates between men and women. Over the long term for both men and women, the financial returns of a college education may repay the actual costs of schooling, as well as the wages lost by not working during the college years. The NLS 72 wage histories up to age 25 show that college probably does pay for young women, but it is too early to say the same for young men.

Limitations of the Data

Basic data in the National Longitudinal Study of the High School Class of 1972 were supplied by 16,683 seniors in the 1972 Base Year survey, by 21,350 in the 1973 First Follow up survey (including 5,670 who did not participate in the base year), by 20,872 in the 1974 Second Follow up survey, by 20,092 in the 1976 Third Follow up survey, and by 18,630 in the 1979 Fourth Follow-up survey. This bulletin is based on the responses of the 17,366 respondents to all four followup surveys. It is possible that the educational and labor market experiences of this group were different from others in their senior class and from preceding and following senior classes.

Since the statistics presented are estimates derived from a sample, they are subject to two broad kinds of error, sampling and non sampling. Non sampling errors arise from such sources as the failure of some sample members to complete the survey forms, the misinterpretation of questions, the incorrect transcription of responses for computer processing, changes from one senior class to the next, and so on. Sampling errors occur because the data were supplied by only a sample of 1972 high school seniours, not the population of 1972 seniors throughout the United States.

One of the non sampling errors that could potentially influence these findings is "non response bias," which refers to the bias resulting from systematic differences between those who respond and those who do not. The NLS-72 suffers from a modest amount of sample attrition over the years. of the 16,683 seniors who first participated in 1972, 94 percent, 93 percent, 89 percent, and 83 percent participated in the first, second, third, and fourth followup surveys, respectively, and of the 21,350 former seniors who participated in 1973, 95 percent, 91 percent, ano 84 percent participated in the second, third, and fourth followup surveys. With response rates as high as this, any non response bias should be relatively low.

The sample used in this survey is one of a very large class of possible samples of the same size that could have been selected. Estimates derived from different samples would differ from one another. The standard error of an estimate is a measure of the precision with which an estimate from a particular sample approximates the value that would be obtained if data were collected from the entire population instead of from a sample.

Wage rates generally have a skewed distribution, with very few earning the lowest wage rates, most earning moderate wage rates, and many spread out over a wide range of higher wage rates. The median was chosen as a better summary statistic than the mean because it is less sensitive to a small number of very large wage rates than is the mean.

The standard error of an estimated median depends on the form of the distribution as well as the size of its base. An approximate method for measuring the reliability of a median is to determine an interval about the estimated median such that there is a stated degree of confidence that the median based on the complete population would lie within that interval. The following procedure may be used to estimate the 95 percent confidence limits of a median based on sample data. First, the standard error of the median (the 50th percentile) can be determined from the formula, standard error(m) $1.2 \sqrt{50 \cdot 50 / n}$, where n is the sample size and 1.2 is a factor used to adjust for the particular sample design used in the NLS 72. Next, add to and subtract from 50 percent, 1.96 times the value of the standard error just obtained. These values are the upper and lower percentiles that contain the 95 percent confidence interval. Finally, convert percentiles to wage rates using the distribution of hourly wage rates in each group defined by values of educational level and year, these values will be the limits of the confidence interval.

Wage rates were converted from current to 1980 dollars by dividing by a ratio of each years' Consumer Price Index (CPI) to the 1980 Consumer Price Index. From 1972 to 1979, the CPI divisors were as follows: .530, .551, 600, .667, .714, .755, .807, and .882.

Supporting Data for Graphic Presentations

To facilitate legibility, the graphic presentations in figures 1 and 2 do not contain information on the number of cases or the confidence intervals around the points on the graphs. The curved lines between the points on the graphs were interpolated and smoothed to a best fit defined by a spline procedure for each set of points. Points based on fewer than 55 cases were not plotted.

Tables 1-4 present the values of the medians plotted in figures 1 and 2, the wage rates that constitute the upper and lower 95 percent confidence bounds for each median, and the number of cases on which each statistic is based. Since the distribution of wage rates is skewed, the lower confidence bound is generally closer to the median than is the upper bound. The medians in each cell of the tables are based only on those individuals who reported being employed more than 1 hour of work in an average week on the job. Those not working in any given category were excluded.

For More Information

Information about the Center's statistical program and a catalog of NCES publications may be obtained from the Statistical Information Office, National Center for Education Statistics, 400 Maryland Avenue SW., (Mail Stop 1001), Washington, D.C. 20202, telephone (301) 436-7900.

Table 1.--Median hourly wage rates of young women by age and education

Education level in 1979 at age 25	Year and age							
	1972 18	1973 19	1974 20	1975 21	1976 22	1977 23	1978 24	1979 25
	Constant 1980 dollars							
No college:								
Upper bound . .	3.74	4.08	4.43	4.31	4.38	4.70	4.65	4.72
Median	3.73	4.07	4.33	4.24	4.27	4.63	4.64	4.57
Lower bound . .	3.57	3.93	4.17	4.14	4.19	4.56	4.63	4.52
Number of cases	2073	2294	2312	2459	2412	2684	2757	2817
Less than 2 years of college:								
Upper bound . .	3.75	4.17	4.57	4.49	4.73	4.95	5.01	5.18
Median	3.67	4.08	4.42	4.47	4.61	4.93	4.94	5.09
Lower bound . .	3.54	4.03	4.37	4.39	4.53	4.73	4.82	4.94
Number of cases	910	1147	1234	1318	1305	1451	1484	1473
2 years or more of college:								
Upper bound . .	3.56	3.61	4.32	4.49	4.72	4.96	5.32	5.64
Median	3.48	3.60	4.16	4.47	4.54	4.94	5.11	5.36
Lower bound . .	3.37	3.55	4.13	4.30	4.38	4.79	4.94	5.10
Number of cases	554	738	890	1072	1084	1268	1285	1299
Bachelor's degree:								
Upper bound . .	3.34	3.50	3.33	3.73	4.90	5.55	5.93	6.24
Median	3.28	3.39	3.32	3.51	4.72	5.30	5.73	6.06
Lower bound . .	3.13	3.27	3.31	3.40	4.59	5.27	5.57	5.87
Number of cases	559	814	930	1067	1469	1901	1940	1950
Advanced degree:								
Upper bound . .	3.59	3.73	3.32	3.75	5.58	6.56	7.41	7.39
Median	3.49	3.56	3.29	3.55	4.66	6.09	6.38	6.99
Lower bound . .	3.02	3.17	3.19	3.26	4.17	5.49	6.19	6.40
Number of cases	59	80	97	109	145	192	205	212

Source: U.S. Department of Education, National Center for Education Statistics, unpublished tabulations from the National Longitudinal Study of the High-School Class of 1972.

Table 2. Median hourly wage rates of young men by age and education

Education level in 1979 at age 25	Year and age							
	1972 18	1973 19	1974 20	1975 21	1976 22	1977 23	1978 24	1979 25
	Constant 1980 dollars							
No college:								
Upper bound . .	4.70	5.43	6.02	5.96	6.11	6.60	6.61	7.08
Median	4.63	5.42	5.83	5.76	5.95	6.59	6.44	7.06
Lower bound . .	4.47	5.31	5.76	5.62	5.78	6.28	6.20	6.79
Number of cases	2139	2311	2517	2763	2796	2996	3049	3078
Less than 2 years of college:								
Upper bound . . .	4.40	5.31	5.80	5.62	6.12	6.57	6.63	7.07
Median	4.25	5.08	5.55	5.62	5.88	6.24	6.20	6.94
Lower bound . .	4.14	4.99	5.40	5.42	5.60	5.96	6.19	6.75
Number of cases	874	1015	1216	1369	1390	1493	1525	1532
2 years or more of college:								
Upper bound . .	4.02	4.50	4.98	5.24	5.57	6.17	6.20	6.77
Median	3.76	4.41	4.88	5.06	5.31	5.96	6.20	6.50
Lower bound . .	3.74	4.16	4.63	4.94	5.24	5.79	6.19	6.30
Number of cases	801	864	1062	1222	1268	1475	1514	1535
Bachelor's degree:								
Upper bound . .	3.77	3.97	3.99	4.00	5.25	6.24	6.49	7.06
Median	3.75	3.78	3.76	3.75	5.08	5.96	6.20	6.86
Lower bound . .	3.71	3.63	3.66	3.73	4.89	5.83	6.19	6.78
Number of cases	659	793	942	1066	1436	1946	2001	2035
Advanced degree:								
Upper bound . .	3.77	4.43	4.24	4.35	5.65	6.56	7.63	7.68
Median	3.75	4.11	3.78	3.63	5.22	6.26	6.82	7.08
Lower bound . .	3.47	3.34	3.20	3.30	4.47	5.58	6.20	6.70
Number of cases	61	76	83	105	147	201	209	227

Source: U.S. Department of Education, National Center for Education Statistics, unpublished tabulations from the National Longitudinal Study of the High School Class of 1972

Table 3 Median hourly wage rates of young woman in 1979 at age 25 before and after leaving school, by educational level

Education level in 1979 at age 25	Years before and after leaving school												
	-4.6	-3.6	-2.6	-1.6	-0.6	0.4	1.4	2.4	3.4	4.4	5.4	6.4	7.4
	Constant 1980 dollars												
No college:													
Upper bound . .	-	-	-	3.76	3.76	3.77	4.16	4.44	4.39	4.41	4.73	4.65	4.67
Median	-	-	-	3.31	3.61	3.76	4.08	4.36	4.30	4.37	4.64	4.64	4.52
Lower bound . .	-	-	-	3.00	3.35	3.76	4.07	4.22	4.19	4.26	4.61	4.63	4.50
Number of cases	5	8	10	41	300	2238	2318	2228	2266	2212	2358	2287	2032
Less than 2 years of college:													
Upper bound .	-	-	4.05	3.67	3.75	4.24	4.54	4.73	4.84	4.96	5.09	5.23	5.43
Median	-	-	3.49	3.31	3.65	4.13	4.46	4.64	4.68	4.80	4.96	5.03	5.11
Lower bound . .	-	-	3.07	3.12	3.62	4.04	4.34	4.49	4.55	4.64	4.81	4.94	5.00
Number of cases	16	23	35	101	513	1166	1136	1094	1056	1027	962	788	365
2 years or more of college:													
Upper bound . .	4.08	3.50	3.71	3.74	3.87	4.68	4.97	5.24	5.36	5.65	5.65	6.03	6.78
Median	3.73	3.29	3.48	3.59	3.66	4.54	4.79	4.97	5.13	5.39	5.31	5.60	5.64
Lower bound . .	3.23	3.08	3.30	3.39	3.60	4.41	4.63	4.86	4.96	5.11	5.01	4.87	4.48
Number of cases	72	131	201	395	631	984	970	897	782	604	397	81	32
Bachelor's degree:													
Upper bound . .	3.45	3.39	3.53	3.56	3.86	5.40	5.79	6.19	6.38	7.13	-	-	-
Median	3.35	3.31	3.33	3.46	3.74	5.24	5.70	5.89	6.22	6.37	-	-	-
Lower bound . .	3.28	3.18	3.31	3.33	3.70	5.06	5.57	5.70	6.06	5.99	-	-	-
Number of cases	215	502	644	823	1042	1656	1639	1470	1065	108	10	3	1
Advanced degree:													
Upper bound . .	3.69	3.53	3.61	4.64	5.88	7.09	7.63	7.40	7.40	-	-	-	-
Median	3.25	3.31	3.43	3.86	4.96	6.60	7.14	6.86	6.58	-	-	-	-
Lower bound . .	3.00	3.14	3.27	3.41	4.21	6.17	6.20	6.33	5.33	-	-	-	-
Number of cases	44	65	72	83	118	176	141	88	42	7	1	0	0

Source: U.S. Department of Education, National Center for Education Statistics, unpublished tabulations from the National Longitudinal Study of the High School Class of 1972

- indicates too few cases to compute

Table 4. Median hourly wage rates of young men in 1979 at age 25 before and after leaving school, by educational level

Education level in 1979 at age 25	Years before and after leaving school												
	-4.6	-3.6	-2.6	-1.6	-0.6	0.4	1.4	2.4	3.4	4.4	5.4	6.4	7.4
	Constant 1980 dollars												
No college:													
Upper bound . .	-	-	6.26	4.83	5.00	4.75	5.62	6.08	5.99	6.22	6.62	6.75	7.08
Median	-	-	4.83	4.49	4.76	4.71	5.44	5.91	5.96	6.09	6.61	6.50	7.05
Lower bound . .	-	-	3.97	3.76	4.47	4.70	5.43	5.81	5.77	5.94	6.36	6.23	6.79
Number of cases	8	14	34	91	376	2225	2311	2371	2509	2497	2521	2413	2195
Less than 2 years of college:													
Upper bound . .	-	-	5.28	4.29	4.82	5.32	5.87	6.18	6.14	6.50	6.72	7.15	7.47
Median	-	-	3.80	3.77	4.58	5.13	5.66	5.98	5.87	6.20	6.61	6.90	7.07
Lower bound . .	-	-	3.70	3.75	4.37	4.98	5.51	5.76	5.62	6.02	6.45	6.47	6.20
Number of cases	22	25	65	133	554	1100	1104	1106	1064	1010	910	703	364
2 years or more of college:													
Upper bound . .	4.47	4.53	4.48	4.42	4.72	5.72	6.03	6.41	6.61	6.78	7.09	7.57	8.55
Median	4.14	4.32	4.15	4.17	4.54	5.56	5.84	6.21	6.29	6.38	6.76	7.07	8.25
Lower bound . .	3.75	3.76	3.77	3.89	4.48	5.34	5.62	6.07	6.19	6.19	6.51	6.33	5.73
Number of cases	115	116	264	475	803	1133	1090	969	828	649	397	120	54
Bachelor's degree:													
Upper bound . .	3.75	3.85	3.98	4.28	4.63	6.16	6.62	7.08	7.55	7.68	-	-	-
Median	3.71	3.76	3.76	4.15	4.49	5.96	6.61	6.81	7.07	7.06	-	-	-
Lower bound . .	3.65	3.73	3.66	3.96	4.28	5.79	6.41	6.62	6.93	5.59	-	-	-
Number of cases	296	531	635	803	1061	1637	1557	1323	788	58	14	2	1
Advanced degree:													
Upper bound . .	4.82	4.45	4.59	5.30	5.93	7.94	8.43	8.65	-	-	-	-	
Median	3.66	3.53	3.75	4.52	5.15	6.98	7.69	8.04	-	-	-	-	-
Lower bound . .	3.07	3.03	3.30	3.82	4.33	6.34	6.94	6.60	-	-	-	-	-
Number of cases	43	64	60	101	131	183	130	58	23	5	2	2	1

[illegible]