DOCUMENT RESUME

ED 181 828 HE 012 237

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TITLE A Comparison of Professional Earnings by Occupation - 1976.
SPONS AGENCY Carnegie Corp. of New York, N.Y.
PUB DATE Jun 79
NOTE 15p.; Paper presented at the Annual Academic Planning Conference (4th, University of Southern California, Office of Institutional Studies, Los Angeles, CA, June 11-13, 1979); for related document see HE 012 235

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *College Faculty; Comparative Analysis; Females; Geographic Location; Higher Education; *Income; Males; *Professional Occupations; Race; *Salary Differentials; *Socioeconomic Status; *Teacher Salaries

ABSTRACT

A comparison of college faculty earnings to earnings of other professionals with comparable educational background is presented in an effort to determine the relative standing of the academic profession among all professional occupations. The information is compiled from self-reported figures of the Bureau of Census survey that provides data on the composition and economic status of the total population. Earnings were assessed for a total of 16 occupational groups by geographic location, age, sex, and race. To be eligible for the survey respondents were required to have completed six or more years of college and to have worked full-time in 1976 in a job classified by the Census Bureau as "professional." The results indicate that college faculty as a group earn an average income only slightly below the mean earnings of the total sample of professional occupations. When adjusted to reflect the specific effects of occupation, the results indicate that college faculty earn approximately $600 less than university and school administrators. Relatively small effects on earnings were noted for the race and sex variables. Scientists, engineers, and social scientists did earn incomes significantly higher than comparable academics. The data are extensively tabulated and the methodology explained. (SF)

A COMPARISON OF PROFESSIONAL EARNINGS BY OCCUPATION - 1976

by

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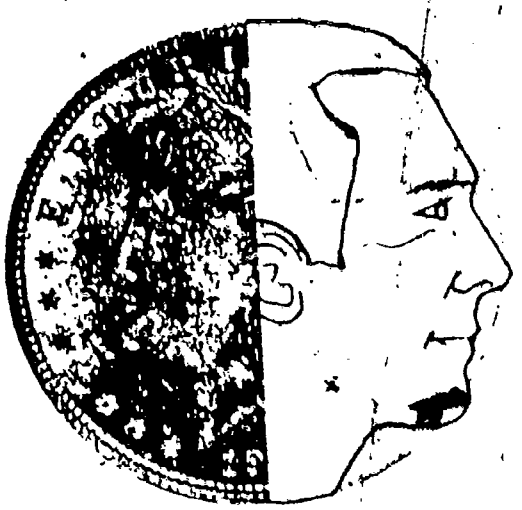

Presented at the Fourth Annual Academic Planning Conference
"ETHICAL AND ECONOMIC ISSUES: ACADEMIC PROFESSIONALISM AND COMPENSATION IN AN ERA OF ACCOUNTABILITY, LIMITS AND INFLATION"
June 11, 12, and 13, 1979
University of Southern California
Office of Institutional Studies
Los Angeles, California 90007

Support of the Carnegie Corporation of New York is gratefully acknowledged

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INTRODUCTION

This study compares and analyzes earnings of various professional occupations as self-reported to the Bureau of the Census survey, "Current Population Survey, March 1977". The primary focus of this analysis is the comparison of the earnings of college faculty with the earnings of other professionals with comparable educational backgrounds. The purpose of the study is to determine, on the basis of earned income, the relative standing of the academic profession among all professional and professionally related occupations.

Various analyses have been made of salaries paid to academic versus nonacademic scientists and engineers. Prominent among these are two studies which have been conducted or sponsored by federal agencies: National Survey of Compensation, 1976 (Battelle and ERDA, 1976) and Characteristics of Experienced Scientists and Engineers, 1976 (NSF, 1976). In terms of the specific group of scientists and engineers, both can offer more detailed analyses due to the specificity of their data bases than the current study can derive from a prescribed data base. However, both the Battelle/ERDA and NSF studies limit their definition of earnings to basic annual salaries. This limitation may have significant impact on the reporting of earnings of academic scientists and engineers in particular, since it is likely that many of these academicians earn above base "supplemental" income from summer research and consulting. In the current study, scientists (and other faculty) are compared with all other professional groups on the basis of total self-reported earnings.

METHODS

Sample

Data were obtained from the Bureau of the Census "Current Population Survey, March 1977" (CPS, 1977). This annual survey provides current data on the composition and economic status of the total population, based upon a sample which is located in 461 sample areas. These areas comprise 923 counties and independent cities drawn from every state in the country.

The survey is designed to provide comprehensive information on the employment status, occupation, and industry of every person over age 14 in a surveyed household. It also provides information about personal characteristics: sex, race, educational background, marital status, and income.

For this study, research variables consisted of all personal characteristics variables, the geographic division variable, personal earnings, and all personal employment variables for respondents meeting the following criteria:

1. Completed six or more years of college;
2. Worked full-time in 1976 and at the time of the survey. (Full-time is defined as 35 or more hours per week, 40 or more weeks per year);
3. Worked in a job classified as "Professional and Related" (Census classification) in both 1976 and 1977.

The sample was chosen upon the basis of these criteria because only full-time professional employees were appropriate for comparisons of relative earnings. Furthermore, since the occupational group, College Faculty, was of primary interest in relation to other groups, an effort was made to define the educational level of the other respondents in terms of that attained by faculty.

The resulting research sample consisted of 2405 cases out of the total CPS original sample of about 100,000.

Definition of Research Variables

For the purposes of this study a total of 16 occupational groups were used. The variable OCCUPATION consists of the following categories, with the percentage of the total sample represented by each in parentheses: Accountants (1.6%), Engineers (5.6%), Technicians (2.6%), Managers and Executives (14.0%), Lawyers and Judges (9.7%), Librarians and Curators (1.5%), Scientists-nonacademic (3.0%), Health Practitioners-doctors and related professionals (13.2%), Other Health Workers - nurses and others (1.9%), Clergy and Other Religious (4.2%), Social Scientists-nonacademic (2.5%), Social and Recreation Workers and Counselors (4.0%), College Faculty (9.9%), School Teachers (17.8%), Artists and Entertainers (2.0%), University and School Administrators (6.7%).

These 16 categories were created by grouping related occupations from the detailed list of job titles under the Census heading, "Professional and Related Occupations". The income variable used in the following tables is total personal earnings for 1976. The variable, EARNINGS, consists of all reported wages or salary, self-employment income and farm income. As has been noted in previous studies based upon Census data, self-reported income as reported by the Bureau of the Census is generally lower in amount when compared with other measures of income (Bowen, 1978). For this reason, the dollar amounts cited may not be comparable with other sources of income data (i.e., Ladd-Lipset or AAUP for college faculty income). However, for the purposes of this study - earnings comparison among occupational groups - the earnings reported are assumed to be comparable relative to occupation.

Other variables which were taken from the CPS, March 1977 for use in the current study are listed below. The percent of the total sample represented by each category is indicated in parentheses.

GEOGRAPHIC LOCATION. The location of the respondent's residence was assigned to one of the following nine categories: New England (7.5%), Middle Atlantic (14.8%), East North Central (16.0%), West North Central (9.7%), South Atlantic (13.7%), East South Central (3.8%), West South Central (8.0%), Mountain (9.4%), Pacific (17.0%).

AGE. The mean age of the sample is 41.3 years, with an oldest age of 85 and a youngest of 22 (Median = 39.5).

SEX. The sample comprises 1,910 (79.4%) men and 495 (20.6%) women.

RACE. The three general categories defined by this variable are: White (93.3%), Black (4.2%), Other (2.6%).

Analysis

The EARNINGS variable was broken down by each of the five control variables: OCCUPATION, GEOGRAPHIC LOCATION, AGE, SEX, and RACE. The analysis of variance procedure employed is documented in Statistical Package for the Social Sciences (Nie[et al] ; 1975). With this procedure, the deviation of each group mean from the mean of the total sample and an "adjusted deviation", representing the difference between the adjusted mean and the grand mean, are generated. This adjusted mean represents an earnings value which is controlled for other control variables. In other words, the adjusted mean for any group shows more specifically the effects of that group on earnings without the confounding effects of the other control variables. For this presentation, the values best showing the effects of each of the control variables on earnings are the adjusted mean earnings values. To the extent that the group of five control variables accounts for variance in the dependent variable (in this case, the variance accounted for is 44.1%), comparison of the adjusted means with the grand mean (i.e., the adjusted deviation) reflects the effects of a given control variable on earnings.

RESULTS

In Table 1, the mean earnings for each of the occupational groups are reported. As shown, College Faculty ranks eighth out of 16 occupations in total personal earnings.

Table 1

Mean Personal Earnings in 1976 by Occupation

	Mean	Rank	STD DEV	STD ER	N
Accountants	21713	4	11677	1869.8	39
Engineers	24332	5	8320	718.8	134
Technicians	18896	10	7405	933.0	63
Managers & Executives	24718	3	12851	702.1	335
Lawyers & Judges	28175	2	14356	938.5	234
Librarians & Curators	14277	13	4830	816.4	35
Scientists	21054	7	9379	1105.4	72
Health Practitioners	36187	1	15787	885.3	318
Health Workers	13634	15	4455	656.9	46
Clergy & Religious	10418	16	5177	515.2	101
Social Scientists	19030	9	9225	1201.0	59
Soc & Rec Wkrs, Counselors	15750	11	5560	567.5	96
College Faculty	19840	8	6990	454.1	237
School Teachers	14982	12	4901	237.2	427
Artists & Entertainers	13995	14	8980	1309.9	47
Univ & School Admin	21378	6	9134	719.8	161
WITHIN TOTAL GROUP	22133		10380	211.7	2404

Total Cases = 2405
Missing Cases = 1 or 0.0 pct.

It must be noted that one of the criteria for sample selection, completion of six or more years of college, may have distorted mean earnings for some of the occupational groups. While many of the 16 professional or related occupational groups in Table 1 do require six or more years of college, it is acknowledged that not all require that much education. Additionally, some of the older members of certain occupations may not have needed as high a

level of educational attainment at the time they entered their careers as is currently required. Since the exclusion of these respondents might result in the omission of a higher income group (associated with age), a comparison was made between the chosen sample and a sample selected on identical criteria except for the educational attainment criterion. Table 2 represents the same occupational categories and includes the cases shown in Table 1 but also includes respondents who attended (not necessarily completed) five or more years of college.

Table 2

Mean Personal Earnings in 1976 by Occupation for Research Sample plus all CPS Respondents Who Attended Five or More Years of College.

	Mean	Rank	STD.DEV	STD ER	N
Accountants	21798	5	12865	1420.7	82
Engineers	22842	4	8961	566.8	250
Technicians	18124	10	7419	674.5	121
Managers & Executives	22878	3	12057	490.2	605
Lawyers & Judges	27797	2	14345	924.0	241
Librarians & Curators	13716	13	4723	585.8	65
Scientists	19494	7	9623	948.2	103
Health Practitioners	34857	1	16466	873.9	355
Health Workers	13628	15	4906	517.2	90
Clergy & Religious	10390	16	5284	484.4	119
Social Scientist	18659	9	8559	957.0	80
Soc & Rec Wkrs, Counselors	15594	11	5950	492.4	146
College Faculty	19109	8	7005	427.9	268
School Teachers	13641	14	4587	152.0	909
Artists & Entertainers	15162	12	10036	1115.2	81
Univ & School Admin	20376	6	8608	594.0	210
WITHIN GROUPS TOTAL	20071		9799	160.5	3725

Total Cases = 3726

Missing Cases = 1 or 0.0 pct.

From a comparison of Tables 1 and 2, it is apparent that for most occupations, increased level of educational attainment is associated with increased income. However, the mean and rank of earnings for college faculty remain essentially the same.

Table 3 presents an analysis of variance with total personal earnings (EARNINGS) as the dependent variable and OCCUPATION, GEOGRAPHIC LOCATION, AGE, SEX, AND RACE as the independent or control variables. As noted, OCCUPATION accounts for the majority of variance explained by these control variables. The other control variable which explains an appreciable amount of variance is age. However, for each of the five control variables, F is statistically significant ($p < .01$).

Of particular interest in Table 3 are the adjusted mean earnings for the variable OCCUPATION. Since these values represent the effect of type of occupation on earnings without the effects of the respondents' ages, locations, sexes and races inherent in the actual mean presented, it is apparent that occupation does account for at least some of the substantial differences evident among groups.

Additionally, the variable AGE shows some effect on the distribution of personal earnings. Mature career years are generally acknowledged to be between 40 and 60 years of age and these earnings figures agree with that general assumption. While age does not account for a large amount of the explained variance (8.0% uniquely), it does have some impact.

Table 3: Total Personal Earnings in 1976. Analysis of Variance Due to Occupation, Geographic Location, Age, Sex, and Race

Total N=2405	Actual Mean	Adjusted Mean[1]	N
OCCUPATION			
Accountants	$21711	$22759	39
Engineers	24332	23846	134
Technicians	18896	19470	63
Managers and Executives	24645	23746	336
Lawyers and Judges	28175	28089	234
Librarians and Curators	14277	17053	35
Scientists	21055	21194	72
Health Practitioners	36188	36022	318
Other Health Workers	13635	18125	46
Clergy and Religious	10419	9556	101
Social Scientists	19030	20700	59
Social and Recreation Workers and Counselors	15751	17204	96
College Faculty	19840	19433	237
School Teachers	14983	16085	427
Artists and Entertainers	13995	15268	47
University and School Administrators	21378	20023	161
% of total variance explained by OCCUPATION = 32.5% (24.5%)			
GEOGRAPHIC LOCATION			
New England	$20344	$20669	181
Middle Atlantic	24471	23304	355
East North Central	23123	22787	386
West North Central	20797	21325	234
South Atlantic	23432	23645	330
East South Central	18175	21864	91
West South Central	20111	20197	192
Mountain	20428	20293	227
Pacific	22400	22837	409
% of total variance explained by GEOGRAPHIC LOCATION = 1.7% (1.1%)			
AGE			
20-30	$14782	$15447	429
31-40	21372	21420	839
41-50	25562	25427	603
51-60	26108	25736	394
61-70	23575	23160	128
71-85	18055	14440	12
% of total variance explained by AGE = 9.6% (8.0%)			
SEX			
Male	$24027	$22993	1910
Female	14780	18770	495
% of total variance explained by SEX = 9.0% (1.4%)			
RACE			
White	$22449	$22317	2243
Black	16191	21086	100
Other	19927	16816	62
% of total variance explained by RACE = 1.0% (.5%)			
TOTAL SAMPLE			
Mean	$22124		
Median	18612		
Standard Deviation	12620		
% of variance explained by all control variables = 44.1%			
SIGNIFICANCE OF F			
For each variable: Occupation, Location, Age, Sex, Race $p < .01$			

[1] The Adjusted Mean is the group mean that would be expected without the effects of the other four control variables.

Note: "% of total variance explained" (eta squared) refers to the proportion of the total sample variance that can be explained by the control variable. The value in parentheses refers to the proportion of variance due uniquely to the control variable (i.e., variance which cannot be explained by one of the other control variables).

Interesting to note for their apparently small effects on earnings in the sample are variables RACE and SEX. From this information, it seems more likely that Blacks in the sample have lower actual earnings due rather to age or to occupational group (the choice of which admittedly may have been influenced by race) than directly to RACE. The earnings of Blacks without the effects of the other four control variables (see Adjusted Mean) are only about $1200 below those of Whites. However, the adjusted mean earnings of "Other" (non-White, non-Black) respondents are substantially lower (by $5500) than those of Whites. The fact that this group is relatively small in relation to the total sample masks its impact on total variance but it is readily apparent that differences in earnings are associated with membership in this nonspecific racial category.

For the variable SEX, the difference between the adjusted means for each sex is $3512. This difference is not nearly as great as the almost $10,000 difference between the actual means for males and females. The reduction in salary differences by sex reflected in adjusted means would indicate that other control variables (most probably OCCUPATION and AGE) impact strongly on the respective earnings of men and women.

One issue raised by those concerned with the level of college faculty salaries is a belief that professionals employed in comparable jobs in industry and government receive higher salaries than do academics. Since this concern is most frequently voiced about academic scientists and engineers, an attempt was made in this study to compare reported earnings for scientists and engineers in academic and nonacademic settings. The results of this comparison are presented in Table 5.

As indicated in the table, the difference in EARNINGS accounted for by employment in academic versus nonacademic settings is not statistically significant.

When the variables, AGE, RACE, SEX, and LOCATION are considered as control variables in an analysis of variance in which the fifth control variable comprises academic and nonacademic scientists and engineers, there is slightly more difference between the adjusted earnings of the two groups than is apparent from the unadjusted means in Table 5. In other words, when the control variables are held constant, academic scientists and engineers have an adjusted mean earnings which is about $2000 less than that for scientists and engineers. Despite this increased difference in earnings between the two groups, the difference is still not statistically signigicant.

Table 5

Comparison of EARNINGS of Scientists and Engineers by Academic and Nonacademic Sources of Employment.

	Mean	Adjusted Mean[1]	N
Nonacademic	22557	22745	226
Academic	21548	20744	53
Significance of F	$p > .05$ (NS)	$p > .05$ (NS)	

[1]The Adjusted Mean represents the effects of nonacademic/academic source of employment with the effects of AGE, RACE, SEX, and LOCATION held constant.

Note: The definition of "Scientists and Engineers" corresponds to that adopted in Characteristics of Experienced Scientists and Engineers (NSF, 1976), with the exclusion of all Social Scientists.

The NSF study (1976) includes in its comparison of nonacademic and academic salaries of scientists and engineers the salaries of social scientists. A comparable comparison was made using CPS data and the results are shown in Table 6. Again, the difference in actual mean salaries between the groups is not statistically significant.

When earnings of scientists, engineers, and social scientists are analyzed with the variables AGE, SEX, RACE, and LOCATION controlled, the difference between the resulting adjusted mean earnings shown in Table 6 is $2097. The unique variance accounted for by the academic versus nonacademic sources of employment is only 1.28%, but this difference is statistically significant ($p < .01$).

Table 6

Comparison of EARNINGS of Scientists, Engineers and Social Scientists by Academic and Nonacademic Sources of Employment

	Mean	Adjusted Mean[1]	N
Nonacademic	21801	22090	282
Academic	20615	19993	131
Significance of F	$p > .05$ (NS)	$p < .01$	

[1]The Adjusted Mean represents the effects of nonacademic/academic source of employment with the effects of AGE, RACE, SEX, and LOCATION held constant.

Note: The definition of "Scientists, Engineers and Social Scientists" corresponds to that adopted in Characteristics of Experienced Scientists and Engineers (NSF, 1976).

DISCUSSION

College faculty as a group earn on the average an income that is slightly below the mean earnings of the total sample of professional occupations. When earnings are adjusted to reflect the specific effects of OCCUPATION (controlling for AGE, SEX, LOCATION, and RACE) college faculty earn about $600 less than university and school administrators, and somewhat less than nonacademic social scientists and scientists. It is difficult to generalize the comparability of college faculty with other occupations beyond these superficial observations but the data would indicate that for an overall comparison of professional earnings, college faculty are centered close to the total group's mean earnings.

On a more specific level, when the earnings of academic and nonacademic scientists and engineers are compared, little difference in mean earnings is apparent. It would appear from these results that faculty scientists and engineers can earn academic incomes which are comparable to those for non-academic scientific positions.

A slightly different result is found when nonacademic and academic social scientists are added to the initial group of scientists and engineers. While this comparison does result in a statistically significant difference in earnings due to source of employment (nonacademic versus academic), the variance accounted for in earnings is only 1.28%. It is difficult to state that academic scientists' incomes fall short of those in nonacademic sectors based upon the small amount of variance indicated.

Generally, this study has found the earnings of college faculty to be in keeping with the earnings of other professional persons having similar educational backgrounds. Furthermore, there is little in this study that would indicate that the nonacademic occupational groups which are frequently compared with faculty scientists, engineers, and social scientists actually do earn incomes different enough from those of comparable academics to warrant the concern so frequently voiced by faculty and their supporters. Admittedly, the earnings reported by faculty to the CPS survey are likely to include supplemental earnings as well as basic salary income. If this is true, it would seem that such income does tend to more closely balance the earnings of (science-related) faculty with respect to the earnings of nonacademic scientists, engineers, and social scientists.

REFERENCES

Battelle (for ERDA). National Survey of Compensation, 1976: Paid Scientists and Engineers Engaged in Research and Development Activities. Battelle, Columbus Laboratories, Ohio, 1976.

Bowen, Howard R. Academic Compensation: Are Faculty and Staff in American Higher Education Adequately Paid? TIAA/CREF, New York, 1978.

National Science Foundation. Characteristics of Experienced Scientists and Engineers, 1976: Detailed Statistical Tables, Appendix B. Washington, D.C., 1978.

U.S. Bureau of the Census. Public Use Samples of Basic Records from the 1970 Census: Description and Technical Documentation. Washington, D.C. 1972.