

EARNING PATTERNS AND CHANGES IN ECONOMICS AND OTHER SCIENCES

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INTRODUCTION AND SUMMARY

This paper examines trends in the earnings of economists over the past two decades. Changes in the earnings of economists are compared with changes in the earnings of people in other science and engineering fields. Detailed comparisons of earnings differences and trends are made by sector of employment (academic and nonacademic), by degree level, and by gender, race, and nativity.¹

During the time period under consideration, wage developments in the U.S. economy have been notable in several ways. In contrast with the high growth rates of the 1950s and 1960s the real wage level barely grew. This pervasive factor reflects the slowdown in labor productivity growth since the early 1970s. In addition, however, wage differentials by skill level changed significantly. During the 1970s the earnings of college graduates fell relative to those of high school graduates, but during the 1980s the relative earnings of college graduates rose sharply.²

The forces affecting the market for economists, particularly doctoral economists, might differ from those affecting the larger market for college graduates. Academic employment is generally more important for persons with Ph.D.'s than it is for the average college graduate. In the 1970s close to 60 percent of doctoral economists were academically employed, a proportion below that for other social scientists but above that for doctoral engineers or natural scientists. The decline in the academic sector during the 1970s (a result of an increased supply of doctorates, declining birth cohorts and, indirectly, a response to the declining return to a college education) could then be expected to exert a depressing effect on the market for doctoral economists as well as for other doctoral fields through the 1970s. This effect, however, could have been partly offset by more abundant nonacademic opportunities for economists than for many other academics. Outside academia, economists are more likely than those in other science fields to be employed in the finance and business services that have thrived since the late seventies.³ However, economists may have faced increasing competition from the recent surge of graduates with advanced degrees in finance, accounting, and other business related fields.

In brief, our analysis of the data shows that the weakness in the academic sector during the 1970s depressed the earnings of economists although not by as much as for other doctoral scientists or engineers. Overall, economists fared somewhat better than people in other fields in the 1970s because the relatively high earnings of economists outside academia continued to grow, and a large proportion of economists shifted into nonacademic employment.

During the 1980s the earnings of doctoral economists increased, but not nearly as rapidly as the earnings of other doctoral scientists or engineers, or of all college graduates. Within academia, the earnings of economists kept pace with those of other scientists. However, outside academia the earnings of economists increased only slightly, while the salaries of other science professionals and engineers increased rapidly. Possibly competition from finance and business graduates had an effect. We note that the salaries of finance and accounting faculty remained substantially above those of economics professors during the 1980s, confirming a common impression. Despite the sluggish growth in economists' earnings in the 1980s, however, economics is tied with engineering as the most highly paid of the science and engineering fields for doctorates.

THE DATA

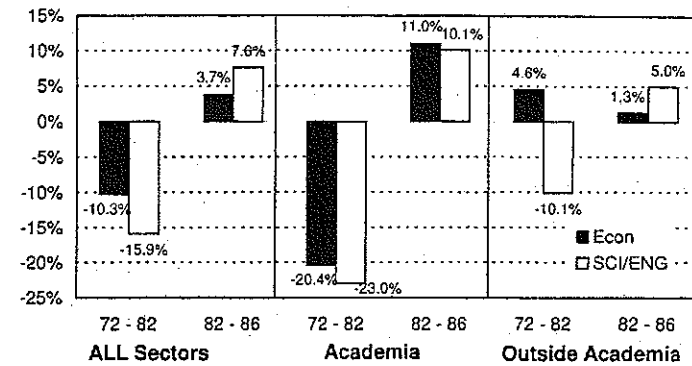
Any analysis of the market for economists is necessarily hampered by the lack of abundant data for such a small group in the population. The primary data sources for this paper are the public use samples of the Survey of Natural and Social Scientists and Engineers (SSE), which consist of two panels of data for persons identified as scientists or engineers in the 1970 and 1980 censuses. The 1970 panel was interviewed in even numbered years 1972-78; the 1980 panel in even numbered years 1982-1986. A detailed description of the data is available upon request from the authors. However, certain important features of the data should be kept in mind in interpreting the findings presented here.

Inclusion in the SSE sample is based on employment in a science or engineering occupation in the decennial census year. The sample, therefore, excludes persons who hold a science or engineering degree but who were reported as working in a non-science occupation in the decennial census year. People who were employed in a science occupation in 1970 or 1980 and subsequently took a non-science job would, however, be included in the data set. About 10 percent of all doctorates in science and engineering fields and 15 percent of doctoral economists are estimated to hold jobs in a field other than a science or engineering field [NSF, 1988].⁴

Since the data set consists of two panels—one for the 1970s and one for the 1980s—each sample ages during the decade and, therefore, becomes less representative of the population. We have used standard multiple regression techniques to adjust for the effects of the aging of the cohort. These controls, however, do not entirely eliminate possible cohort effects.

The earnings information that is available consistently for all survey years is the annual salary rate on the respondent's primary job. This measure excludes earnings

FIGURE 1
Percentage Change in Real Annual Salaries in Ph.D.s in
Economics and in All Science/Engineering Fields



Derived from regression coefficients of individual year dummies, controlling for years of work experience, gender, race, nativity, and other factors (available upon request). The changes over the period 1972-86 are: for all sectors -7% for economists and -9.5% for all SCI/ENG; -11.5% in academia (respectively); and -3.3% and -5.6% out of academia (respectively).

from second jobs and supplementary sources such as summer jobs, consulting, or bonuses.⁵ In some years respondents were asked to report the salary on the primary job as well as total earnings from all sources during the year. A comparative analysis of the two earnings measures indicated that, as expected, salary on the primary job understates total earnings but mainly in academia where the primary job is more likely to allow time for additional employment. This analysis uses the measure of earnings on the primary job because it is available consistently and provides the longest series of observations. However, we include variables that measure academic/nonacademic employment and recognize that differences between the sectors are partly attributable to the exclusion of outside earnings of academics.

One additional adjustment to the earnings data was the estimation of the earnings of respondents whose salaries were top-coded by the Census. The methodology for these imputations along with other issues related to the earnings data is available upon request.

To adjust for the effects of inflation, earnings were converted from nominal to real terms using the Bureau of Labor Statistics experimental Consumer Price Index (CPI-U-X1).⁶

EARNINGS TRENDS

During the period 1972 to 1986 the basic salaries of doctorate holders in economics declined by seven percent in real terms, somewhat less than the decline of 9.5 percent experienced by doctorates in all science and engineering (SCI/ENG) fields (Figure 1). The period of decline, however, was confined to the decade 1972-1982, as earnings increased during the 1980s in real terms. Both the decline in the 1970s and the rise in the 1980s were not as pronounced for economists as for those in other SCI/ENG fields. The salaries of economics doctorates fell by 10 percent from 1972 to 1982 (compared to 16 percent among all SCI/ENG fields); but they increased by only 3.7 percent from 1982 to 1986—half the rate of increase among the other scientists.

It is evident that the large declines in real earnings in academia during the 1970s (declines of 20 percent or more) were a major factor underlying the erosion of doctorates' earnings during the decade. The effect on economists may have been smaller because they were able to benefit from opportunities in non-academic employment. Earnings increased by almost five percent for economics Ph.D.s who were employed outside academia between 1972 and 1982. By contrast, real earnings in non-academic employment fell during this period by 10 percent among all SCI/ENG Ph.D.s.

During the 1980s the situation was reversed as nonacademic employment seems to have become less favorable for economists. Within academia the earnings of economists increased as rapidly as the earnings of other SCI/ENG Ph.D.s. But outside academia economists' earnings barely increased, while those of the other SCI/ENG Ph.D.s grew by five percent.

Supply shifts may have contributed to the patterns of the 1980s. Although both economists and other SCI/ENG doctorates shifted into non-academic employment from the 1970s to the 80s, the shift was greater for economists. In the 1970s close to 60 percent of economics doctorates were academically employed compared to 43 percent in the 1980s. These percentages for all SCI/ENG doctorates were 52 percent in the 1970s and 44 percent in the 1980s.⁷

The patterns just described are based on regression analysis using microdata from the NSF Surveys of Scientists and Engineers (SSE). The reported salary changes are observed holding constant years of professional experience, gender and other characteristics.

How do these results compare with those from other data sources? The NSF sponsors another data base covering science and engineering professionals, the Survey of Doctorate Recipients (SDR), an ongoing sample of persons earning doctorates in the U.S., followed up biennially. Only simple earnings tabulations are available from the SDR (for odd years) and these are unadjusted for compositional shifts.⁸ In broad outline, however, the patterns resemble those that emerged from our analysis of the SSE data (Table 1). The earnings of Ph.D. economists reported in the SDR also declined by seven percent over the period 1973-1985. However, other SCI/ENG doctorates experienced smaller declines than the economists in the SDR data during the period 1972-1981 and over the entire 1973-85 (or 1973-87) period. The SDR data (like our SSE data) show a rise in earnings during the 1980s and a stronger rise for all SCI/ENG fields than for economics doctorates. Given the many definitional differences

TABLE 1
Median Annual Salaries (in 1986 dollars) of Ph.D.s in
All Science and Engineering Fields and in Economics
Data from the NSF Surveys of Doctorate Recipients (SDR)

	All Sectors		Educational Institutions	
	All SCI/ENG	Economics	All SCI/ENG	Economics
1973	47,688	50,683	44,002	47,458
1975	44,839	47,159	41,360	43,873
1977	43,987	46,220	40,722	43,128
1979	42,707	45,348	38,744	41,973
1981	41,825	43,874	37,486	40,137
1983	44,132	45,563	39,840	41,381
1985	45,656	46,980	41,375	43,312
1987	47,854	49,012	44,681	46,311
Percentage Change:				
1973-1985	-4.3	-7.3	-6.0	-8.7
1973-1987	+0.3	-3.3	+1.5	-2.4
1973-1981	-12.3	-13.4	-14.8	-15.4
1981-1985	+9.2	+7.1	+10.4	+7.9
1981-1987	+14.4	+11.7	+19.2	+15.4

Data are from The National Science Foundation, Survey of Doctorate Recipients, published in Characteristics of Doctoral Scientists and Engineers, various issues. Salaries of academics are inflated by 11/9 by NSF. Persons in educational institutions include non-teaching professionals employed in administration, research, and other occupations. This includes a larger group than those identified as academically employed in the analysis of the SSE surveys.

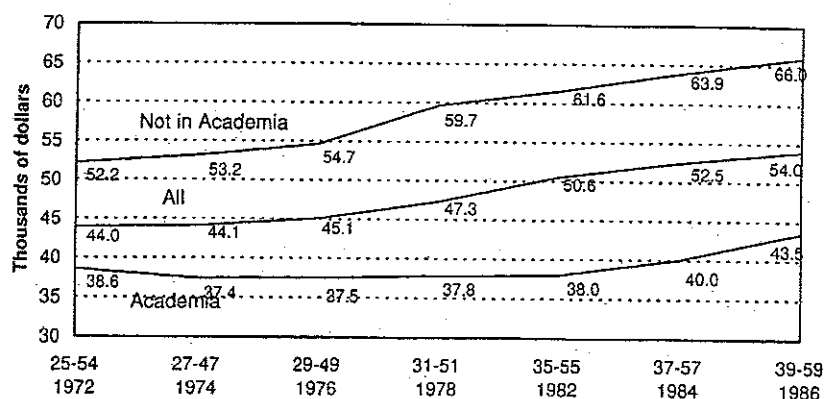
between the two data sources, however, one should not expect the two sets of data to yield precisely the same patterns of change.

To put our results in a broader perspective we have also compared them with earnings trends in the economy over the same period. Table 2 provides data on annual earnings trends for men (by schooling level) who work full-time year-round. (Economists in our sample are predominantly men, as are other SCI/ENG Ph.D.s.) The patterns observed are again roughly similar to those observed in the SSE data. Real earnings on average declined substantially from 1972 to 1982, but rose between 1982 and 1986. However, the rebound for high school graduates is negligible (1.5 percent) while the earnings of college graduates increased by 11.5 percent. In fact, the rise in the earnings of college graduates during the 1980s is so substantial that it exceeds the rise observed for doctorates in the sciences.

COHORT CHANGES IN EARNINGS

Most of the analysis conducted here examines changes in earnings over time at fixed levels of work experience. (That is, we have held years of professional work

FIGURE 2
Mean Annual Basic Salaries of a Cohort of Economics Doctorates
Ages 25-45 in 1972, Followed Over 14 Years
(in 1986 dollars)



These are unadjusted mean salaries reported by panel members responding to the NSF Surveys of Scientists and Engineers (SSE). Persons responding in 1972-1978 are part of a sample drawn from the 1970 census; those responding in 1982-86 are from a sample drawn from the 1980 census.

experience constant using regression analysis.) Figure 2 shows the changes in the earnings of the cohort of economists ages 25-45 in 1972, followed over the period 1972 to 1986, when they reached ages 39-59.⁹ Earnings changes are shown for doctorates both in and out of academia.

In real terms, the mean salaries of the cohort of economics doctorates increased by 23 percent over the years 1972-86. (Had they stayed in academia, they would have gained only 13 percent; and out of academia, 26 percent.) Thus, because of the human capital effects of experience on earnings, the cohort gained considerably more over the fourteen year period than is observed for a fixed age group (whose earnings in fact declined). Due to the depressing effect of low growth, however, the cohort of doctorate economists starting out in the early 1970s experienced a much lower increase in income over a substantial portion of their careers than would surely have been the case for those starting out in the high growth periods of the 1950s or 1960s.

SALARY DIFFERENCES: ECONOMICS VERSUS OTHER SCI/ENG FIELDS

Table 3 compares the salaries of doctorates in natural sciences, social sciences, and engineering with the salaries of economics doctorates in the 1970s and in the

TABLE 2
Annual Earnings Measures for
Men Who Are Full-Time Year-Round Workers,
by Schooling Level, 1972-1986
In Constant (1986) Dollars

	Median Earnings Age 15 and older	Mean Income High School Grads Age 25 and older	Mean Income College Grads + Age 25 and older
1972	24,966	28,324	43,760
1976	24,589	27,459	42,024
1980	24,564	26,689	40,222
1982	23,946	25,816	39,706
1986	25,256	26,211	44,274
Percentage Change:			
1972-1986	+1.2	-7.5	+1.2
1972-1982	-4.1	-8.9	-9.3
1982-1986	+5.5	+1.5	+11.5

Source: U.S. Bureau of Census, Current Population Reports, Consumer Income, Series P-60 various years.

TABLE 3
Logarithmic Salary Differentials Between
Ph.D.s in Economics and Ph.D.s in Other SCI/ENG Fields
in the 1970s and 1980s

	All Sectors	1970s In Academia	Not in Academia	All Sectors	1980s In Academia	Not in Academia
Engineering	-.014 ^a	-.010 ^a	-.067	-.004 ^a	.063	-.042
Biological Science	-.112	-.084	-.228	-.160	-.106	-.251
Health	-.022	-.012 ^a	-.148	-.069	-.054 ^a	-.126
Math	-.101	-.042	-.135	-.103	-.090	-.074
Physical Science	-.075	-.064	-.110	-.082	-.102	-.088
Psychology	-.077	-.030	-.150	-.197	-.098	-.286
Sociology	-.135	-.057	-.289	-.206	-.137	-.277
Oth. Social Science	-.112	-.040	-.215	-.233	-.112	-.423

a. These differentials are *not* statistically significant at the 5 percent level (two-tailed test). Differentials are the difference in the logarithm of annual salaries ($\log \text{salary } i - \log \text{salary economics}$) holding constant years of professional experience, gender, race, nativity and individual year (full regressions are available upon request).

1980s. (The differentials are measured as log salary differentials relative to economics, controlling for years of experience, gender and other characteristics.)

Engineers are the only group of doctorates earning approximately the same salaries as economics doctorates. In academia, engineers earned somewhat more than economists during the 1980s. However, outside academia engineers earn somewhat less than economists, although this difference appears to have narrowed in the 1980s. Differences between other science fields and economics tended to be larger in the 1980s than in the 1970s, particularly for those in psychology, sociology, and the other social sciences, whose earnings were about 20 percent below those with economics degrees in the 1980s. Earnings of doctorates in biological sciences are about 16 percent below those of economists in the 1980s; physical scientists are closer, but still eight percent behind. The differentials are considerably larger outside academia than within academia.

A similar comparison can be made of the salaries of economists and others holding B.A. and M.A. degrees in a SCI/ENG field. Regressions' results (available upon request) indicate that the salary differential in favor of those with economics training observed among Ph.D.s is even larger at the B.A. and M.A. levels. However, most people with college degrees below the Ph.D. level are employed outside academia, and, as noted, it is outside academia where the relative earnings of Ph.D. economists are particularly high. As was the case for Ph.D.s, the salary advantage to holders of B.A. and M.A. degrees in economics tended to be smaller in the 1980s than in the 1970s, with the exception of holders of M.A.s in biology, in the social sciences (other than economics) and in psychology, who experienced significant earnings declines relative to economists and all others with SCI/ENG M.A.s.

The differentials shown are averages over the 1970s surveys and the 1980s surveys and therefore do not reveal the changes during the 1980s. As indicated in Figure 1, salaries in economics grew more slowly than in other fields during the 1980s, particularly outside academia. If current trends continue, we would expect to find a narrowing in the differentials between economics and other fields for a similar panel in the 1990s.

ECONOMICS VS. BUSINESS FIELDS

The SSE data for doctorates are confined to science and engineering fields and, therefore, exclude those with degrees in finance, accounting, or other business fields. The market for economists, however, is likely to be influenced by developments in business fields.

Another perspective is provided by the American Assembly of Collegiate Schools of Business (AACSB) which each year collects data on faculty salaries among its membership, by field and by rank. Table 4 compares the reported salaries of professors of accounting, finance, and economics in business schools with the salaries of professors of economics in all four-year colleges and universities as reported in the Survey of Doctorate Recipients (SDR). The comparisons are shown for assistant, associate, and full professors for odd years, 1981-1987.

TABLE 4
Faculty Salaries in Economics and Related Fields,
by Rank, All Four-Year Colleges and Universities and
Collegiate Schools of Business, 1981-1989

	Four-Year Colleges and Universities	Accredited Collegiate Schools of Business					
	Salaries in 1986 dollars (thousands)	Salaries in 1986 dollars (thousands)			Relative to Economics Slrs in all 4-Yr Colleges and Universities		
		Econ.	Econ.	Acc.	Fin.	Econ.	Acc.
Full Professors							
1981	39.7	45.0	46.5	46.2	1.134	1.171	1.164
1983	40.3	44.9	45.9	46.1	1.114	1.139	1.144
1985	44.1	46.2	48.6	49.4	1.048	1.102	1.120
1987	47.5	50.2	54.5	54.9	1.057	1.147	1.156
1989	-	51.9	57.9	59.6	-	-	-
Associate Professors							
1981	32.2	34.3	37.1	36.2	1.065	1.152	1.124
1983	31.9	33.7	37.5	36.8	1.056	1.176	1.154
1985	32.9	35.6	40.2	39.7	1.082	1.222	1.207
1987	38.1	37.9	44.1	44.0	0.995	1.157	1.155
1989	-	39.7	46.5	46.6	-	-	-
Assistant Professors							
1981	24.3	28.2	31.8	31.3	1.160	1.309	1.288
1983	27.3	27.9	33.1	33.3	1.022	1.212	1.220
1985	28.4	29.8	35.5	35.8	1.049	1.250	1.261
1987	30.4	31.6	39.5	39.9	1.039	1.299	1.313
1989	-	34.0	43.0	43.8	-	-	-

Salaries of economists in four-year Colleges and Universities are medians and the data are from The National Science Foundation, Survey of Doctorate Recipients, published in Characteristics of Doctoral Scientists and Engineers, various years. Salaries of professors in accredited schools of business are means, as reported by the American Assembly of Collegiate Schools of Business, Statistical Reports.

Several points are noteworthy. For one, the salary advantage held by economists in business schools in 1981 was quickly eliminated during the 1980s as their salaries converged with those of economists in academia. Salaries of accounting and finance professors, however, remained considerably above those of economics professors—no convergence there. At the assistant professor level, finance and accounting paid about 30 percent more than economics during the 1980s.

TABLE 5
Gender Differentials in the Log of Annual Salary,
Men Relative to Women,
Ph.D. Holders and all Degree Holders in
Economics and in all SCI/ENG Fields,
1970s and 1980s

	Ph.D. Holders		All College and Advanced Degrees	
	1970s	1980s	1970s	1980s
<u>All Sectors</u>				
Economics	0.2062	0.0725	0.1575	0.0731
All Sci/Eng	0.1541	0.1170	0.1670	0.1004
<u>Academia</u>				
Economics	0.0948	0.0801	0.1492	0.0889
All Sci/Eng	0.1380	0.1325	0.1436	0.1327
<u>Out of Academia</u>				
Economics	0.3609	0.0696	0.1655	0.0694
All Sci/Eng	0.1719	0.0990	0.1778	0.0941

The differentials shown are the coefficients for the dichotomous variable, male=1, in sector-specific log earnings regressions, controlling for years of professional work experience, race, nativity, individual year and in the regressions for all fields, individual field dummies. Complete regressions results are available upon request. The gender coefficients are all statistically significant, mostly at the one percent level.

THE CONVERGING GENDER GAP IN EARNINGS

The proportion of economics degree holders who are women has increased, but is still relatively low. As counted by the SSE, women held 4.5 percent of economics doctorates in the 1970s increasing to 9.3 percent in the 1980s surveys.¹⁰ Women were only somewhat better represented among economists at all degree levels (8 percent in the 1970s; 12 percent in the 1980s). Women have increased more rapidly in other science and engineering fields, although the proportion of women in these fields remains low as well. As revealed in the SSE, women held about 17 percent of all SCI/ENG doctorates in the 1980s, compared to 6 percent in the 1970s.

Salary differentials between men and women declined markedly from the 1970s to the 1980s (Table 5). Among economics Ph.D.s, men earned over 20 percent more than women in the 1970s, but by the 1980s this gap had fallen to around 7 percent.¹¹ This change is almost entirely due to salary convergence in the non-academic sector. The gender differential among economics Ph.D.s within academia was initially much smaller than it was outside academia, and it narrowed only slightly from the 1970s to the 1980s (from 9 percent to 8 percent).

TABLE 6
Race and Nativity Differentials
(with reference to white, U.S. born)
in Log of Annual Salary,
Ph.D. & Other Degree Holders in Economics and in All SCI/ENG Fields,
1970s and 1980s

Race, Place of Birth	Ph.D. Holders		All College & Advanced Deg.	
	1970s	1980s	1970s	1980s
<u>Economics</u>				
White, foreign	-.1240*	.0754*	-.0879*	.0798*
Black, foreign	-	.0402	-.0118	.0840
Black, U.S.	-.1937	-.0137	-.0465	-.0809*
Asian, foreign	-.0507	-.0869*	-.0117	-.0640
Asian, U.S.	-.0951	-.0604	-.0455	-.0507
<u>All SCI/ENG</u>				
White, foreign	.0252*	.0646*	-.0087	.0147*
Black, foreign	.1017	.0317	-.0597	.0769*
Black, U.S.	-.0031	-.0730*	-.0351*	-.0588*
Asian, foreign	-.0311*	-.0291*	-.0885*	-.0375*
Asian, U.S.	-.0123	-.0139	-.0438*	-.0077

Starred coefficients are statistically significant at the 5 percent level (two-tailed test). The number of observations for black Ph.D. economists is very small — 6 U.S. born and no foreign born in the 1970s, 6 foreign born and 13 U.S. born in the 1980s. At all degree levels the number of observations for black economists remains under 20 for foreign born and rises only to 28 in the 1970s and 69 in the 1980s for the U.S. born. The number of observations for U.S. born Asian economists is also small, particularly at the Ph.D. level (9 in the 1970s, 28 in the 1980s). The differentials shown are the coefficients of race, nativity specific dummy variables in log earnings regressions controlling for years of experience and other factors. Separate regressions were run for the 1970s and 1980s within field and degree categories. Full regression results are available upon request.

The pattern of convergence in the gender gap in earnings that is observed among economics doctorates is also evident among doctorates in all SCI/ENG fields, and among degree holders at all levels in economics (and in all SCI/ENG fields). A strong tendency toward convergence in male-female wage differentials during the 1980s has also been evident among all workers in the economy. The level of the gender gap, however, is considerably smaller among doctorates in economics and other technical fields than it is among all workers. Presumably the differences in career orientation and commitment that result in work experience, training, and earnings differentials between women and men generally, are less of a factor once the population is restricted to those who have made similar career choices. However, additional analysis of career patterns and other factors is needed to shed further light on the underlying convergence in the gender differential and the sources of the remaining gap.

TABLE 7
Differences in Log Annual Earnings between Ph.D. Holders
in Different Fields and B.A. Holders in all SCI/ENG Fields

Field	1970s surveys	1980s surveys
Economics	.287	.275
Biology	.176	.117
Engineering	.264	.268
Health	.264	.206
Mathematics	.183	.176
Physical sciences	.208	.192
Sociology	.207	.077
Other Fields	.157	.075

These are coefficients of log earning regressions, all statistically significant under conventional standards. The regressions also include controls for market experience, sex, race, place of birth, employment in academia, if on a nine-month contract, and year of survey. Full regression results and separate regressions by gender and in and out of academia are available upon request.

RACE AND NATIVITY DIFFERENTIALS

The representation of foreign born persons among doctorate economists increased sharply from the 1970s to the 1980s—from 7.4 percent to 16.5 percent. (These percentages are similar for all SCI/ENG doctorates.) Among economists, more than 60 percent of the foreign born are white and about one-third are Asian. (These proportions are reversed for all SCI/ENG doctorates.) The percentage black among Ph.D. economists remains very small. Only one percent of the 1980s SSE sample was black, and close to half of the black economists are foreign born.

Salary differentials between race-nativity specific groups and white native born individuals are shown in Table 6. (Again, these are log salary differentials after controlling for work experience and other characteristics.) Among economics doctorates, the number of observations on blacks is too small to estimate statistically significant or meaningful coefficients. Among all degree holders in economics, blacks born in the U.S. are shown to earn about 8 percent less than native born white economists in the 1980s and this is a statistically significant result. Foreign born blacks are shown to earn more than native born whites in all fields and degree levels in the 1980s, but the effect is significant only for all SCI/ENG fields, at all degree levels.

Foreign born whites also earned more in the 1980s than their white, native born counterparts in economics (about 7 percent more); and this pattern is repeated in all SCI/ENG fields. These differentials are all statistically significant. The earnings of

white foreign born economists had been below those of native born white economists in the 1970s. The composition of more recent immigrants, however, may differ from the group observed in the 1970s.

In the 1980s foreign born Asians earned about 9 percent less than native white economists at the Ph.D. level—a larger gap than among all SCI/ENG doctorates. One possible explanation is that economics may place a higher premium on English speaking skills than the natural sciences or engineering.

Additional analysis is required before one can draw any conclusions about the observed race-nativity differentials. Migrants are known to be positively selected by skill. Factors such as country of origin, country of schooling, length of time in the U.S. and language skills should be taken into account in analyzing the differentials.

RETURNS TO GRADUATE EDUCATION IN ECONOMICS

The premium paid to Ph.D. holders in economics relative to those with only a B.A. in economics was 31 percent in the 1970s and 36.5 percent in the 1980s.¹² Using the standard rule of thumb, we can divide these premiums by four to obtain a rough estimate of the annual rate of return to four years of graduate training, counting only forgone earnings as costs. The result shows a modest rise in the rate of return—from about 8 percent in the 1970s to 9 percent in the 1980s.¹³ The same procedure produces a slight decline in the return to a doctorate in SCI/ENG fields in the aggregate—from 7 percent to 6 percent. However, similar calculations of rates of return to four years of college (relative to high school) show an increase during the 1980s—from 8 percent to 20 percent for men [Koster's, 1991].

One explanation for the dramatic rise in the return to college education points to demand factors that raised the return to skill generally in the economy during the 1980s.¹⁴ One might then have expected that the return to doctoral training would have increased more dramatically than has been the case. However, the demand for persons with doctoral level training is closely related to the demand for college and university faculty. Although the increase in the return to college seems to have spurred an increase in enrollment rates during the 1980s, the diminishing pool of college age youth has dampened growth in enrollment levels. Thus the demand for college faculty may not have increased overall.

Demographic trends suggest that roughly stable enrollments are likely to prevail until the late 1990s when the number of college age youth will again increase. The market for economists, however, may improve sooner than this because of factors on the supply side. The number of doctorates granted in economics each year has not increased over the past decade. In fact, excluding foreign students the number of American doctorates produced each year has actually fallen. The market for economists in academia is also affected by the market for economists in business and government. We will venture no predictions about this market.

NOTES

1. For a detailed analysis of changes in the gender gap in economics and other sciences, see O'Neill and Sicherman [1997].
2. See Freeman [1976] which first brought attention to the decline in the returns to a college education in the 1970s, and Murphy and Welch [1989] who were the first to document the rise in the return to education in the 1980s.
3. For industry employment of economists and other scientists in 1986, see NSF [1988].
4. For an analysis of the transition of scientists and engineers to management, using the 1970 panel, see Biddle and Roberts [1994].
5. For more details on dual-job-holding in the United States, see Paxson and Sicherman [1996].
6. The experimental CPI uses a rental equivalence approach to measuring housing services, correcting a flaw present in the official CPI measure prior to 1983.
7. These percentages are based on sample means of our observations for the 1970s and 1980s SSE surveys.
8. Public use tapes of the SDR have not been made available to researchers (with a few exceptions).
9. These are mean earnings observed in the data for the age groups specified. Since response rates vary from year to year within each decadal panel and since the panel was redrawn in the 80's, these are partly synthetic cohorts. Note too that the cohort means are not regression adjusted for other compositional changes.
10. The proportion female among recent doctoral recipients in economics has been higher—17 percent in 1987. However, recent graduates are not likely to have been included in the 1980 SSE surveys.
11. These are regression results adjusted for differences in years of work experience and other factors that would lead to larger unadjusted gender differentials.
12. These measures are derived from regressions for all degree holders in economics controlling for compositional changes in work experience and other characteristics. Returns to Ph.D. holders in economics and other fields relative to those with a B.A. in all SCI/ENG fields are shown in Table 7.
13. These are overestimates since the direct costs of graduate training are omitted and they may have increased. This would depend on the extent to which recent tuition increases have been matched by subsidies to students.
14. There have been numerous studies on this issue in recent years. See, for example, Juhn, Murphy and Pierce, 1991; Bartel and Lichtenberg, 1987, 1991; Berman, Bound and Griliches, 1994; Berndt, Morrison, and Rosenblum, 1992; Bound and Johnson, 1992; Mincer, 1991; and Topel, 1994.

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