Earnings inequality accelerates in the 1980's

An analysis of annual earnings distributions
finds that earnings inequality increased
within several categories of workers;
of particular note was the increase for men
employed in managerial and sales occupations

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In the early 1980's, many researchers analyzing earnings distributions found that earnings inequality—the gap between the pay of higher and lower paid workers—had been rising for a number of years, and perhaps even decades, particularly among men. Findings in a 1980 study by the authors, for example, revealed that the trend in earnings inequality for men was upwards between 1958 and 1977.[1] Similarly, Robert Plotnick in 1982, and Martin Dooley and Peter Gottschalk in 1984 also found evidence of rising earnings inequality among men.[2] The evidence presented in what follows strongly suggests that earnings inequality accelerated during the 1980's not only for men, but for women as well, and that increases also took place for other demographic, occupational, and industrial groups.

The obvious question, of course, is, Why such an acceleration? What occurred in the 1980's that was so different than in earlier decades? The explanation for rising earnings inequality, as well as issues related to it, such as the "declining middle class" and the "quality of jobs," has been the focus of much research and analysis.[3]

As regards rising earnings inequality, Barry Bluestone and Bennett Harrison have argued that it has been the result of demand-side factors such as industrial restructuring (moving from a goods-producing to a service-producing economy).[4] Marvin Kosters and Murray Ross, on the other hand, have pointed to supply-side factors such as

the maturing of the baby boom generation and the rise in women's labor force participation.[5] Most recently, researchers such as Chinui Juhn, Kevin Murphy, and Brooks Pierce have directed their attention to the widening gap in the returns to education that apparently took place in the 1980's.[6] But despite these explanations, the mechanism by which the Nation's earnings distribution has become more unequal is still not well understood.

The challenge of identifying that mechanism is formidable. The aim of this article is to document the groups whose earnings distributions have become more unequal and perhaps provide researchers with additional insights needed to solve the problem. First, the data and method used to track inequality are discussed. Second, the trend in earnings inequality in the 1980's is presented in the context of the long-run trend. Third, trends between 1978 and 1988 for specific groups of workers are examined. Last, the possible broader economic implications of the trends are explored. (In an appendix are some preliminary findings regarding the returns to education and earnings inequality.)

Data and methodology

Methodological problems involved in the measurement of income or earnings inequality in a society are numerous, and a substantial literature on the subject has evolved over the years.[7]

In the following discussion, therefore, the major limitations associated with the data and method used in our analysis are spelled out.

The primary data analyzed are annual earnings collected in the March supplement of the Current Population Survey (CPS).[8] Annual earnings are comprised of (1) wages and salaries and (2) income obtained from self-employment (both farm and nonfarm). Some researchers have examined only wages and salaries because they are more closely related to market prices for labor. Admittedly, income derived from self-employment may contain returns to physical capital and land, but in our view, excluding self-employment income might have biased the results of the analysis because self-employment and wage and salary employment are market alternatives confronting labor. (Earnings from self-employment account for only about 8 percent of aggregate earnings.) In any case, the distinction between the two sources of labor income should be kept in mind.

The earnings data collected in the CPS impose some limitations on the analysis of earnings inequality. First, the concept used in the CPS is a money income concept and, by definition, excludes the growing proportion of employee compensation that is in the form of noncash benefits (for example, employer-financed health insurance, retirement benefits, and life insurance). However, noncash benefits are more common among middle to high-level earners, which might tend to increase inequality of earnings.[9]

A second problem is nonresponse, which is particularly prevalent among high-income households and no doubt biases analyses of earnings distributions. Although the Census Bureau attempts to lessen the impact of nonresponse through its imputation procedure, the effectiveness of the procedure has been questioned.[10]

Yet another area of concern is truncation bias. Between 1967 and 1984, persons with earnings of $100,000 or more from any one source were coded at $99,999, the top income officially recorded in the survey. After 1984, the upper coding limit was increased to $299,999. As earnings levels shifted upward during these years, the reported earnings levels of a growing proportion of high earners were truncated in the CPS processing system. The effect of truncation bias on measures of inequality has been shown to have some significance.[11]

All three of the foregoing problems tend to bias measures of inequality *downward*, because actual earnings at the upper end of the earnings distribution are the most affected.

Methods. There are various methods for measuring earnings inequality. They range from simple measures like the interquartile range, the coefficient of variation, and the variance of the logarithm of earnings to more complicated constructions such as the Gini index and Theil, Atkinson, and generalized entropy measures. The measure used in this study is the Gini index, one of the more traditional measures for summarizing the degree of dispersion in a distribution.

The Gini index is derived from the Lorenz curve, which shows the relationship between the cumulative percentage of total earnings, measured on the vertical axis, and the cumulative per-

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Table 1. Distribution of earnings of all earners and full-time, year-round earners, 1978 and 1988

Group and year	Thousands of earners	Mean earnings	Gini index[1]	Percent share of aggregate earnings				
				Top fifth	Second fifth	Third fifth	Fourth fifth	Bottom fifth
All earners:								
1978	111,301	$10,286	0.468	48.1	26.0	16.2	7.9	1.8
1988	131,125	19,419	.469	48.6	25.2	15.8	8.3	2.1
Full time, year round:								
1978	61,951	14,961	[2].312	38.9	23.4	17.5	12.8	7.4
1988	79,522	26,679	.343	41.0	23.4	16.9	12.1	6.7
Men, full time, year round:								
1978	41,036	17,526	[2].296	37.3	23.3	18.3	13.6	7.5
1988	48,285	31,093	.337	40.4	23.2	17.4	12.4	6.6
Women, full time, year round:								
1978	20,914	9,929	[2].240	33.4	23.5	18.9	14.9	9.4
1988	31,237	19,854	.296	37.3	23.6	17.9	13.4	7.8

[1] Gini indexes have been derived from grouped data and, in some instances, may differ slightly from those published by the Census Bureau, which may have been calculated from sorted microdata.

[2] Difference between the two Gini indexes for this category is significant at the 10-percent level.

centage of earners, measured on the horizontal axis. In simplest terms, dividing the area between the diagonal line emanating from the origin and the Lorenz curve by the total area beneath the diagonal yields a Gini index.[12] The value of the Gini index can range from 0.0 (perfect equality) to 1.0 (perfect inequality). Perfect equality would result if all earners had identical earnings, while perfect inequality would prevail if only one earner received all the earnings.

As with other measures of inequality, the Gini index has its weaknesses, and some researchers are critical of it.[13] The index is more responsive to changes in the *middle* of the earnings distribution, rather than in the lower or upper ends. Moreover, the Gini index, by itself, does not distinguish which part of the distribution may be causing an increase or decrease in inequality. (This is why quantiles of the distribution are usually presented when the Gini index is used.) Another difficulty occurs when Gini indexes for different groups or years are being compared and the corresponding Lorenz curves intersect each other. This problem is referred to as *Lorenz dominance*, and in such cases the Gini indexes cannot be meaningfully compared. Finally, when the Gini index is used on grouped earnings data,[14] such as in the analysis presented here, it is influenced by the number of earnings intervals in the distribution. As the number of intervals declines, so does the Gini index.[15]

The justification for using the earnings data collected in the CPS and the Gini index, in spite of the problems associated with them, is that both have been used extensively in research related to earnings distributions. The CPS data base is demographically rich and based on a very large sample. The Gini index is one of the best known and most easily understood measures of earnings inequality and is also used by the Census Bureau in assessing income inequality. Moreover, the authors' earlier work was based on this data base and

methodology. In their opinion, when the problems that surround the data and the methodology are considered fully, the estimates of growing earnings inequality during the 1980's that are presented here most likely understate what actually has taken place.

The 1980's versus earlier decades

One aspect of research on earnings inequality that has been overlooked is that when the earnings distribution of all earners is examined, little change in earnings inequality is observed. The Gini index and the shares of aggregate earnings received by each quintile are shown in table 1. Shares of aggregate earnings received by each quintile in 1988 varied little from 1978, and the Gini index for all earners was just shy of .470 in both years.[16] It is only when this broad group of earners is disaggregated by work experience and demographic or other categories that increases in earnings inequality are observed.

Table 1 shows that the earnings distributions of persons who worked full time (35 or more hours a week), year round (50 to 52 weeks a year), did become more unequal between 1978 and 1988. This conclusion also holds separately for men and women with this amount of work experience. These increases were statistically significant, and it was the highest fifth of earners whose share of aggregate earnings rose, while the share of the lowest three-fifths declined.[17] Also, as shown in table 2, earners at the 80th percentile of the distribution experienced much more rapid growth in earnings than those at the 20th and 40th percentiles. In terms of earnings levels, a male worker at the 20th percentile in 1978 had earnings of $9,847, compared to earnings of $23,294 for his counterpart at the 80th percentile; by 1988,

Table 3. Gini indexes for all earners and for earners who worked full time, year round, by sex, 1968 and 1978 through 1988

Year	Total			Full time, year round		
	Both sexes	Men	Women	Both sexes	Men	Women
1968	0.453	0.394	0.444	0.325	0.295	0.256
1978	.468	.413	.446	.312	.296	.240
1979	.463	.415	.434	.322	.306	.249
1980	.460	.416	.435	.317	.302	.249
1981	.462	.424	.435	.321	.306	.253
1982	.467	.436	.442	.327	.315	.265
1983	.467	.436	.444	.327	.316	.267
1984	.467	.433	.447	.328	.317	.273
1985	.471	.439	.450	.334	.328	.276
1986	.472	.441	.450	.340	.334	.286
1987	.469	.440	.449	.339	.332	.288
1988	.469	.441	.451	.343	.337	.296

the worker at the 20th percentile had earnings of $15,548, compared with $42,246 for the worker at the 80th percentile.

Focusing on the annual earnings of full-time, year-round workers, of course, is particularly useful because it eliminates the effect of variations in the proportion of part-time and part-year earners (whether caused by unemployment, family requirements, personal preferences, or whatever) and yields data that are more closely related to the basic functioning of the labor market. The greater dispersion in the distribution of these earnings, therefore, may suggest a widening of the gap in the quality (wage level) of available jobs, or the earnings potential of individuals, or both.

Much of the research into earnings inequality in recent years has contained discussions of long-run trends. Obtaining a clear idea of the long-run trend in earnings inequality is difficult, however, because researchers have used different measures, have focused on different categories of workers over different periods, and have manipulated the data in different ways.[18] Nonetheless, there appears to be a consensus that the trend in inequality was upwards in the 1970's and into the 1980's, particularly for men.

Table 3 shows Gini indexes for 1968 and for each year from 1978 through 1988 for all earners and for all full-time, year-round workers, subcategorized by sex. From 1968 to 1978, earnings grew more unequal only for all men, but between 1978 and 1988, the earnings distributions for all men, as well as for men and women full-time, year-round workers, became more unequal. Moreover, the trend toward inequality *accelerated* during the 1978–88 period relative to the previous decade.

For a longer historical look, Gini indexes over the post-World War II era (1948 to 1987), for wage and salary workers, by sex, and in all work experience categories, are shown in the following tabulation:[19]

Year	Men	Women
1948	0.360	0.412
1958	.398	.481
1968	.377	.447
1978	.406	.437
1987	.433	.443

The data indicate that for men, the movement toward greater wage inequality got under way during the 1940's and 1950's, paused in the 1960's, and continued to grow in the 1970's and 1980's. For women, on the other hand, the greatest increase in inequality appeared to take place in the 1950's, after which there was a decline followed by a period of relative stability. A major factor in the decline in earnings inequality for women after the 1950's undoubtedly was the increasing proportion of women working full time,

Table 4. **Distribution of earnings for white, black, and Hispanic earners who worked full time, year round, by sex, 1978 and 1988**

Race or Hispanic origin, sex, and year	Thousands of earners	Mean earnings	Gini Index	Percent share of aggregate earnings				
				Top fifth	Second fifth	Third fifth	Fourth fifth	Bottom fifth
White men:								
1978	37,210	$17,936	[1]0.295	37.4	23.2	18.3	13.6	7.6
1988	42,716	31,804	.334	40.2	23.2	17.5	12.5	6.7
White women:								
1978	17,967	9,982	[1].240	33.3	23.5	18.9	14.9	9.4
1988	26,206	20,091	.296	37.4	23.6	17.9	13.4	7.8
Black men:								
1978	3,098	12,893	[1].264	34.0	24.7	19.3	13.8	8.2
1988	4,108	23,374	.324	39.3	23.9	17.3	12.5	7.1
Black women:								
1978	2,497	9,377	.235	33.1	23.7	18.8	14.8	9.5
1988	3,985	17,811	.275	35.5	24.2	18.6	13.5	8.3
Hispanic men:[2]								
1978	1,878	12,981	[1].269	35.5	23.7	18.2	13.8	8.8
1988	3,608	21,697	.339	40.9	23.4	16.7	12.0	7.0
Hispanic women:[2]								
1978	859	8,634	[1].232	32.9	23.7	18.8	14.9	9.7
1988	1,966	16,860	.301	38.0	23.6	17.5	13.0	8.0

[1] Difference between the two Gini indexes for this category is significant at the 10-percent level.

[2] May be of any race.

Table 5. Distribution of earnings for men who worked full time, year round, by industry, 1978 and 1987

Industry and year	Thousands of earners	Mean earnings	Gini Index	Percent share of aggregate earnings				
				Top fifth	Second fifth	Third fifth	Fourth fifth	Bottom fifth
Total:								
1978	41,036	$17,526	[1]0.296	37.3	23.3	18.3	13.6	7.5
1987	47,080	29,866	.332	40.0	23.4	17.6	12.5	6.6
Agriculture, forestry, and fishing:								
1978	1,722	10,896	.448	47.6	24.5	16.1	9.5	2.3
1987	1,611	17,199	.432	47.2	23.7	15.5	10.3	3.3
Mining:								
1978	477	20,899	.258	35.1	22.4	18.6	15.3	8.7
1987	487	35,738	.282	37.2	21.8	18.1	14.0	8.9
Construction:								
1978	3,202	16,730	.302	37.8	23.6	17.8	13.2	7.6
1987	4,156	25,994	.306	37.7	24.1	18.1	12.9	7.2
Manufacturing:								
1978	12,316	17,692	[1].247	33.9	23.3	19.0	14.7	9.1
1987	11,999	30,619	.286	36.7	23.4	18.2	13.7	8.0
Transportation, communications, and public utilities:								
1978	3,729	18,233	.224	31.9	23.4	19.7	15.6	9.4
1987	4,737	31,407	.252	34.1	23.3	19.0	15.0	8.7
Wholesale trade:								
1978	2,211	18,682	.296	37.6	23.0	18.1	13.5	7.8
1987	2,721	30,242	.325	39.9	23.1	17.2	12.6	7.2
Retail trade:								
1978	4,943	14,194	[1].314	38.6	23.5	17.7	13.1	7.1
1987	5,794	23,496	.351	41.3	23.6	17.1	11.7	6.2
Finance, insurance, and real estate:								
1978	1,939	22,187	.344	41.5	22.6	16.7	12.3	6.9
1987	2,480	40,394	.376	45.1	22.5	15.9	10.8	5.7
Business and repair services:								
1978	1,636	16,423	.347	41.6	23.0	16.7	12.3	6.5
1987	2,876	28,787	.379	43.7	23.4	16.1	11.1	5.7
Personal services:								
1978	604	12,420	.339	40.6	23.1	17.1	12.5	6.6
1987	765	20,295	.357	41.8	23.6	17.0	11.7	5.9
Entertainment and recreation services:								
1978	272	14,601	.331	39.5	23.9	17.6	12.8	6.2
1987	448	26,705	.360	41.9	23.6	17.0	11.4	6.1
Professional and related services:								
1978	4,944	20,777	.350	42.7	21.7	16.3	12.0	7.3
1987	6,113	36,187	.365	43.7	22.6	16.3	11.5	6.0
Public administration:								
1978	3,041	18,233	.209	31.9	22.5	19.1	15.8	10.7
1987	2,895	29,966	.229	32.5	23.6	19.2	15.1	9.5

[1] Difference between the two Gini indexes for this category is significant at the 10-percent level.

year round; earnings inequality among these workers is typically less than for all women workers. The patterns described are similar to those found by other researchers.[20] It should be kept in mind that these Gini indexes relate to men and women wage and salary workers from all work experience categories, and not full-time, year-round earners.

A closer look at the 1980's

Rising earnings inequality between 1978 and 1988 took place during a period of significant economic and demographic developments.[21] Inflation, recession, and recovery all played themselves out at the same time that the Nation's economy was operating in the shadows of its

international trade deficits and the Federal Government's fiscal deficit. In addition, the inexorable process of industrial restructuring continued in its incremental way to alter the Nation's economic landscape. Against this backdrop, wage levels were becoming more dispersed among a wide range of groups.

Race, Hispanic origin, and sex. Table 4 shows the earnings distributions for full-time, year-round workers by sex and race or Hispanic origin. For every group except black women, the Gini index displayed a statistically significant increase. And in most instances, it was the top fifth of earners who gained, while earners in

Table 6. Distribution of earnings for women who worked full time, year round, by industry, 1978 and 1987

Industry and year	Thousands of earners	Mean earnings	Gini Index	Percent share of aggregate earnings				
				Top fifth	Second fifth	Third fifth	Fourth fifth	Bottom fifth
Total:								
1978	20,914	$9,929	[1]0.240	33.4	23.5	18.9	14.9	9.4
1987	29,810	18,839	.288	36.7	23.7	18.1	13.6	8.0
Agriculture, forestry, and fishing:								
1978	151	5,672	.491	49.6	25.7	15.5	7.6	1.7
1987	289	9,983	.428	45.2	24.9	18.5	9.6	1.8
Mining:								
1978	65	—	—	—	—	—	—	—
1987	122	26,331	.267	37.5	20.6	17.1	14.5	10.3
Construction:								
1978	225	9,499	.209	31.9	22.8	18.8	15.6	10.9
1987	317	18,059	.204	31.4	22.9	19.0	15.9	10.7
Manufacturing:								
1978	4,351	9,706	[1].207	31.6	23.2	18.9	15.4	10.9
1987	5,088	18,645	.265	35.6	23.5	17.9	13.9	9.1
Transportation, communications, and public utilities:								
1978	1,026	12,076	.207	31.3	23.2	19.3	15.8	10.5
1987	1,609	23,488	.226	32.0	23.9	19.5	14.9	9.7
Wholesale trade:								
1978	601	10,184	.217	32.5	22.9	18.7	15.3	10.7
1987	874	19,425	.294	38.1	22.6	17.4	13.5	8.5
Retail trade:								
1978	2,885	7,824	.253	34.1	23.8	18.5	14.9	8.7
1987	4,255	13,618	.304	38.0	23.8	17.5	13.3	7.4
Finance, insurance, and real estate:								
1978	2,102	9,616	.195	31.2	22.5	18.9	15.9	11.5
1987	3,547	17,984	.159	27.2	25.6	20.2	16.0	11.0
Business and repair services:								
1978	458	9,420	.243	33.8	23.2	18.7	15.1	9.2
1987	1,290	19,876	.321	39.3	23.4	17.5	12.7	7.2
Personal services:								
1978	804	6,328	.342	39.1	25.0	18.4	12.7	4.8
1987	1,279	12,269	.334	39.8	24.1	17.4	12.7	6.0
Entertainment and recreation services:								
1978	100	—	—	—	—	—	—	—
1987	205	16,181	.289	37.9	22.6	17.5	13.8	8.2
Professional and related services:								
1978	6,971	10,862	[1].231	32.9	23.4	19.0	14.9	9.9
1987	9,129	20,118	.264	34.9	23.8	18.5	14.2	8.6
Public administration:								
1978	1,176	11,903	.192	30.5	23.3	18.9	15.8	11.5
1987	1,806	21,853	.241	34.5	22.5	18.0	14.8	10.2

[1] Difference between the two Gini indexes for this category is significant at the 10-percent level.

NOTE: Dash indicates that base is too small to derive estimates.

Table 7. Distribution of earnings for men who worked full time, year round, by occupation, 1982 and 1988

Occupation and year	Thousands of earners	Mean earnings	Gini Index	Percent share of aggregate earnings				
				Top fifth	Second fifth	Third fifth	Fourth fifth	Bottom fifth
Total:								
1982	40,105	$23,637	[1]0.315	38.4	23.7	18.0	13.0	6.9
1988	48,285	31,093	.337	40.4	23.2	17.4	12.4	6.6
Managerial and professional specialties:								
1982	11,946	31,993	.304	37.8	23.4	17.9	13.4	7.6
1988	14,317	43,539	.323	39.8	22.7	17.3	13.1	7.2
Technical, sales, and administrative support:								
1982	8,409	23,693	[1].295	37.3	23.2	18.3	13.6	7.6
1988	9,760	30,856	.321	39.6	22.7	17.5	12.9	7.2
Service:								
1982	2,958	15,826	.272	35.3	24.4	18.2	13.8	8.3
1988	3,655	21,142	.308	37.9	24.3	17.7	12.7	7.5
Precision production, craft, and repair:								
1982	7,918	21,742	.240	32.5	24.5	19.5	14.8	8.8
1988	9,759	27,039	.254	33.5	24.6	19.2	14.3	8.5
Operators, fabricators, and laborers:								
1982	7,114	18,197	.253	33.7	24.4	19.0	14.1	8.8
1988	9,016	22,619	.271	35.0	24.5	18.6	13.7	8.1
Farming, forestry, and fishing:								
1982	1,761	10,304	.417	43.9	26.7	17.7	9.8	2.0
1988	1,687	17,957	.428	47.5	22.5	15.8	10.5	3.8

[1] Difference between the two Gini indexes for this category is significant at the 10-percent level.

the first three-fifths of the distribution experienced a relative loss in their share of aggregate earnings. For example, among white men, those in the top fifth had an increase in their share of earnings from 37.4 percent to 40.2 percent, while those in the lower three-fifths saw their share fall from 39.5 percent to 36.7 percent. Black men in the top fifth of their distribution experienced an increase from 34.0 percent to 39.3 percent. In absolute amounts, the gap in earnings between white men at the 20th and 80th percentiles in 1978 extended from $9,529 to $22,085; by 1988, it ranged from $16,020 to $43,022.

Other researchers have shown that inequality increased among earners in many age-sex groups[22] and among earners grouped by varying amounts of education and labor market experience.[23]

Industry and occupation. It is not too surprising to see the trend toward more earnings inequality occur also in industry and occupation groupings. Table 5 presents earnings distributions for men who worked full time, year round by industry. Gini indexes for men were higher in 1987 than in 1978 in every industry except agriculture.[24] However, in only two industries

were the increases statistically significant at the 10-percent level: Manufacturing, where the index rose from .247 to .286, and retail trade, where it increased from .314 to .351. In each of these industries, it was the top fifth of earners who gained a greater share of aggregate earnings at the expense of the lower three-fifths.

Table 6 shows earnings distributions for women full-time, year-round earners by industry. Gini indexes increased in fewer industries than was the case for men, but two industries showed statistically significant increases in earnings inequality: Manufacturing and professional and related services. (Professional and related services contains such diverse businesses as dentists' and physicians' offices, hospitals, educational institutions, and legal services.) In manufacturing, the Gini index advanced from .207 to .265. In professional services, the index rose from .231 to .264, and in both industries changes in the earnings distribution by quintiles paralleled those noted for men. Women, of course, still earned much less than men (64 percent of men's earnings in 1988, compared with 57 percent in 1978).

Occupational data for men and women who worked full time, year round in 1982 and 1988 are

shown in tables 7 and 8. (The Federal Government's system for classifying occupations changed in 1982, making it impossible to extend the comparison back to 1978.) While earnings inequality had clearly increased during the mid-1980's in every broad occupational category for both men and women, statistically significant increases occurred only in the technical, sales, and administrative support category for both groups. The top fifth of earners experienced much greater increases in their annual earnings than those at the lower end of the distribution.

The occupational earnings data can be utilized to shed light on the oft-expressed contention that the ongoing restructuring of the American economy has resulted in an employment shift from relatively higher paying production-type jobs to lower paying service-type jobs. The data indeed show that service occupation jobs yield lower annual earnings than production-type jobs and, of course, much lower earnings than professional and managerial jobs. However, in terms of the pay increases over the period 1982–88, those at the higher paying end of the service occupation category have done as well as or better than either

those in production-type jobs or those in the professional and managerial category. Table 9 shows the percent change in the annual earnings of men and women in the 20th and 80th percentiles of earnings between 1982 and 1988.

Detailed occupations. The analysis of earnings inequality can be extended to more detailed occupations through the use of the CPS, as well as the various employer wage surveys conducted by the BLS.

In the case of the CPS, the Census Bureau publishes earnings distributions for roughly 75 detailed occupations within the six broad occupation groupings shown in tables 7 and 8.[25] Gini indexes were computed for all these distributions of both men and women who worked full time, year round in 1982 and 1987. Although there was evidence of growing earnings inequality among many of the detailed occupations, only a handful exhibited changes that were statistically significant at the 10-percent level. Many of these occupations, of course, are represented by only a small number of persons in the CPS sample. Nevertheless, the occupations that did display significant increases are of interest.

Table 8. Distribution of earnings for women who worked full time, year round, by occupation, 1982 and 1988

Occupation and year	Thousands of earners	Mean earnings	Gini Index	Percent share of aggregate earnings				
				Top fifth	Second fifth	Third fifth	Fourth fifth	Bottom fifth
Total:								
1982	23,702	$14,327	[1]0.265	35.1	23.6	18.3	14.3	8.6
1988	31,237	19,854	.296	37.3	23.6	17.9	13.4	7.8
Managerial and professional specialties:								
1982	6,313	19,084	.242	33.5	23.2	18.9	15.1	9.2
1988	9,762	26,250	.253	34.3	23.4	18.6	14.7	9.0
Technical, sales, and administrative support:								
1982	11,493	13,573	[1].225	32.6	23.3	18.7	15.4	10.0
1988	13,933	18,340	.258	35.0	23.1	18.3	14.5	9.1
Service:								
1982	2,826	9,359	.271	35.3	23.4	18.6	14.8	7.8
1988	3,665	12,482	.308	38.5	23.0	17.7	13.5	7.4
Precision production, craft, and repair:								
1982	548	14,736	.239	33.4	23.9	18.5	14.5	9.7
1988	799	19,007	.290	37.1	23.7	17.8	13.3	8.1
Operators, fabricators, and laborers:								
1982	2,359	11,779	.221	32.7	23.2	18.7	14.8	10.6
1988	2,869	14,806	.253	34.8	23.4	18.0	14.4	9.4
Farming, forestry, and fishing:								
1982	162	4,770	.357	35.8	32.6	21.7	7.7	2.3
1988	194	10,807	.467	47.5	26.0	17.8	7.0	1.7

[1] Difference between the two Gini indexes for this category is significant at the 10-percent level.

Table 9. Percent change in annual earnings, selected percentiles, 1982-88

Category	Percentile	
	20th	80th
Men:		
Managerial and professional . .	32.3	30.4
Precision production, craft, and repair	22.6	24.1
Operators, fabricators, and laborers	15.6	26.1
Service occupations	20.0	38.2
Women:		
Managerial and professional . .	36.7	40.2
Precision production, craft, and repair	17.6	30.8
Operators, fabricators, and laborers	21.7	29.6
Service occupations	15.2	37.4

Table 10. Change in Gini index, men and women administrators, officials, and sales workers versus all other occupations, 1982-87

Category	1982	1987	Difference
Men:			
Total	0.315	0.332	0.017
Administrators, officials, and sales workers	.322	.353	.031
All other occupations . . .	.302	.312	.010
Women:			
Total	.265	.288	.023
Administrators, officials, and sales workers	.317	.380	.063
All other occupations . . .	.259	.277	.018

NOTE: All changes were statistically significant at the 10-percent level of confidence except that for men, all other occupations.

One of the detailed occupational groups for men in which there was a significant change was the category of salaried administrators and officials in private industry, comprising more than one-third of the managerial and professional specialty occupations. These are the occupations of persons such as financial managers, personnel directors, advertising executives, and so on. This single group increased in size by nearly 950,000 workers between 1982 and 1987. The Gini index for the group increased from .289 to .326.

As mentioned earlier, inequality also rose for men in the broad group of technical, sales, and administrative support occupations. (The comparison here was between 1982 and 1988.) The majority of the men in this category were employed in sales occupations, such as securities salesmen, insurance salesmen, and real estate salesmen, as well as sales workers in retail and personal services. Employment rose by 805,000 in these sales occupations, and the Gini index increased from .331 to .365, a statistically significant increase.

Widespread increases also occurred in the Gini indexes for many of the detailed occupations in which women were employed during the mid-1980's, but few were statistically significant. As mentioned earlier, women's earnings in the technical, sales, and administrative support occupations became more dispersed. Within this broad group, inequality became particularly pronounced in the sales occupations, for which the Gini index rose from .317 to .380.

When the earnings distributions for men employed as administrators, officials, and sales workers—detailed occupations comprising 22

percent of all men full-time, year-round workers in 1987—are combined, it can be shown that the trend toward earnings inequality taking place in these occupations alone was sufficiently powerful to influence the trend for all men. The Gini index for all men rose from .315 to .332, but in the managerial and sales occupations combined, it increased from .322 to .353. When an index was calculated for all other occupations combined, it increased only from .302 to .312, a change that

Table 11. Employment Cost Index, wages and salaries, by occupation, December 1975, December 1980, and December 1989

Occupation	Employment Cost Index (June 1981 = 100)			Percent change		
	Dec. 1975	Dec. 1980	Dec. 1989	1975-80	1980-89	1975-89
Private industry	65.2	95.4	145.1	46.3	52.1	122.5
White-collar workers	66.2	95.2	150.8	43.8	58.4	127.8
Professional, specialty, and technicians	65.6	95.3	155.9	45.3	63.6	137.7
Executives, administrators, and managers	68.4	94.7	149.5	38.5	57.9	118.6
Sales	—	94.8	143.8	—	51.7	—
Administrative support (including clerical)	65.5	95.7	150.6	46.1	57.4	129.9
Blue-collar workers	63.7	95.7	137.6	50.2	43.8	116.0
Precision production, craft, and repair	64.5	96.1	140.0	49.0	45.7	117.1
Machine operators, assemblers, and inspectors	62.8	95.5	138.1	52.1	44.6	119.9
Transportation and material movers	63.6	95.3	130.2	49.8	36.6	104.7
Service workers	65.6	94.8	150.1	44.5	58.3	128.8

NOTE: Dashes indicate data not available.

was not statistically significant.[26] Table 10 shows Gini indexes for men and women in these occupational categories in 1982 and 1987.

In the case of women, sales occupations also had an impact on the overall trend in earnings inequality, but changes in other occupations appear to have exerted an influence as well. Changes in the Gini index for women in the sales occupations and in all other occupations were both statistically significant.

Data from the BLS employer wage surveys are not directly comparable to data from the CPS, but they do provide a greater historical perspective from which to infer changes in earnings distribu-

tions. Two examples are noteworthy.

Table 11 utilizes the BLS's Employment Cost Index to examine wage and salary levels in private industry at three different points in time: December 1975, December 1980, and December 1989.[27] It is clear from the data that the higher paying white-collar occupations recorded greater percentage increases in earnings over this 14-year period than did the lesser paying blue-collar occupations. This differential developed during the 1980–89 period. For the first 5 years following 1975, the lesser paying occupations did better, on the whole, than the higher paying occupations. For the entire period, the highest paying group

Table 12. **Changes in median salaries in selected white-collar occupations in the private nonservice industries, 1960/61 to 1988**

Occupation and level	Number of employees, March 1988	Median annual salary, 1988	Percent change in median salary			
			1960/61–1970	1970–1980	1980–1988	1960/61–1988
Accountants:						
Level I	15,209	$22,320	50.1	75.4	49.4	293.2
Level III	45,508	32,873	47.6	98.0	58.1	362.0
Level V	7,506	52,679	48.1	108.2	67.3	415.9
Auditors:						
Level I	1,423	22,991	71.6	68.7	56.4	352.9
Level IV	1,869	41,592	51.8	91.2	55.5	351.3
Chief accountants:						
Level I	940	41,496	50.6	108.4	42.3	346.8
Level III	500	68,800	58.3	116.4	72.0	489.2
Chemists:						
Level I	2,304	26,268	57.7	74.2	64.2	351.3
Level III	7,775	37,985	52.7	99.9	64.1	400.9
Level V	4,292	54,878	50.6	98.5	63.7	389.1
Level VI	1,469	66,180	48.9	89.9	78.7	405.5
Engineers:						
Level I	29,607	29,688	54.8	91.1	52.3	350.6
Level III	121,166	37,985	46.4	93.7	59.5	352.2
Level V	89,649	54,744	48.9	93.8	66.7	381.2
Level VII	9,360	74,748	36.8	94.1	73.5	350.7
Level VIII	1,542	86,355	32.3	97.4	76.3	360.4
Directors of personnel:						
Level I	1,717	42,091	45.4	90.4	75.8	386.9
Level III	1,042	70,900	48.3	109.9	89.5	489.9
Office messengers	8,068	12,108	47.5	79.4	52.2	303.1
Key entry operators:						
Level I	59,276	13,519	—	89.8	44.0	[1]173.4
Level II	29,675	17,676	—	96.0	57.2	[1]208.2
Typists:						
Level I	15,880	13,121	41.3	87.3	51.9	301.9
Level II	7,520	16,848	37.9	94.7	62.1	335.2
Engineering technicians:						
Level I	3,930	17,724	—	87.4	50.2	[1]181.3
Level III	28,498	24,804	—	93.3	51.5	[1]192.8
Level V	17,341	34,263	—	101.1	55.2	[1]212.0
Drafters:						
Level II	9,375	16,119	—	106.4	42.0	[1]193.0
Level V	8,749	32,508	—	110.3	54.7	[1]225.4

[1] Percent change is based on the period 1970 to 1988.

NOTE: Dashes indicate data not available.

Earnings inequality in 1989

Immediately before this article went to press, the Census Bureau released its "advance" data on the income and poverty status of households, families, and persons for 1989 collected in the March 1990 Current Population Survey. Included in this information are the earnings distributions for men and women in 1989.

According to the data, earnings inequality continued to increase for men in 1989. The Gini index rose from .337 in 1988 to .348 in 1989, a statistically significant increase. The share of

aggregate earnings received by the highest fifth of earners rose from 40.4 to 41.5 percent, while the middle three-fifths' share fell from 53.0 percent to 51.9 percent. For women, on the other hand, there was virtually no change in earnings inequality from 1988 to 1989, although, as with men, there had been an increase during the 1980's.

The following tabulation shows the Gini indexes and the percentage shares of aggregate earnings of each quintile for male and female full-time, year-round workers:

Sex and year	Gini index	Quintile				
		1st	2nd	3rd	4th	5th
Male, full time, year round						
1988	0.337	6.6	12.4	17.4	23.2	40.4
1989	.348	6.6	12.0	17.0	22.9	41.5
Female, full time, year round						
1988	.296	7.8	13.4	17.9	23.6	37.3
1989	.298	7.7	13.3	17.9	23.6	37.6

(professional, specialty, and technical occupations) recorded the greatest increase. The effect of the differential, of course, is to push the upper part of the distribution even higher, while holding back the lower portion.

This earnings differential is further confirmed by data from the BLS National Survey of Professional, Administrative, Technical, and Clerical Pay. For this survey, employers are asked to provide data not only for specified occupations, but for a series of gradations or levels within such occupations. For example, the BLS differentiated five levels of accountants and eight levels of engineers.

Table 12 shows 1988 median annual salaries for a series of individual white-collar occupations and percent changes for the periods 1960/61–70 (when the survey was initiated), 1970–80, and 1980–88, and the overall period 1960/61–88. With two exceptions (auditors and engineers), in general, the higher the level of pay and responsibility, the greater was the pay increase over the 28-year period. Once again, this differential is greatest during the 1970's and 1980's. For example, the pay for Accountants I rose 49 percent in the 1980–88 period, while the comparable figure for Accountants III was 58 percent and for Accountants V, 67 percent. Thus, even within most white-collar occupations, whose pay was increasing more rapidly than that of the lower paying blue-collar occupations, the gains of the higher levels were outpacing those of the lower levels.

One additional piece of evidence is worthy of mention. A nongovernmental annual survey of

compensation awarded chief executive officers of major corporations places the average such compensation for 1989 at $1,856,697.[28] This represents a threefold increase from the 1980 figure. For a roughly comparable period, 1978–87, the rise in earnings for full-time, year-round male earners was 55 percent in the construction industry, 73 percent in manufacturing, 66 percent in retail trade, 74 percent in professional and related services, and 64 percent in public administration. (These percentages may be computed from table 5.)

Such increases in compensation for chief executive officers may well have helped trigger similar, though perhaps less dramatic, increases among the higher managerial corporate ranks, with rippling effects spreading to competing and related firms. This kind of result would be consistent with the evidence already cited that the pay of higher ranking professional, administrative, and managerial positions has outpaced that of middle and lower level positions on the pay ladder.

Concluding remarks

The results of the analysis presented here of the trend in earnings inequality during the 1980's are consistent with those of many other researchers: the earnings of workers who were strongly attached to the work force at the end of the 1980's were significantly more dispersed than were the earnings of similar workers at the end of the 1970's. But unlike the trend in earlier decades, during the 1980's earnings inequality

had accelerated among male and female full-time, year-round workers and had increased among whites, black men, Hispanics, and workers in various occupations and industries. Of particular note were the significant increases in earnings inequality in the managerial and sales occupations for men and sales occupations for women. Indeed, it appears that the increase among men in the managerial and sales occupations during the mid-1980's was sufficiently strong to affect the trend for all men who worked full time, year round.

Given, then, this practically across-the-board increase in earnings inequality during the 1980's, an obvious question for the coming decade would appear to be, Will the trend continue? Or will it, on the contrary, subside and even reverse itself? The answer to these questions is unclear: a number of economic shifts have taken place in the last 10 years that have perhaps transformed the way American business performs. Among these changes are the greater demand for skilled labor and its accompanying premium on higher wages;

the diminishing importance of national boundaries in today's highly competitive world; the continuing turn toward a more service-oriented rather than production-oriented economy; and the increasing emphasis on takeovers, buyouts, and other shifts in ownership leading to the substitution of debt for capital.

To complicate matters further, accompanying these economic developments have been various changes in governmental policy. Government regulation of business, policy toward the environment, and oversight of financial institutions will undoubtedly have some effect on the climate in which compensation decisions are made, but just what effect is hard to say. In any event, key to an understanding of the phenomenon of earnings inequality is the idea that trends noted in this article must be viewed, not as an isolated statistical result, but rather, as one aspect of America's overall economic performance and social setting. And it is in that setting, and with that performance, that earnings inequality trends in the 1990's will unfold.   □

Footnotes

[1] See Peter Henle and Paul Ryscavage, "The distribution of earned income among men and women, 1958–77," *Monthly Labor Review*, April 1980, pp. 3–10. For an even earlier analysis by one of the authors, see Peter Henle, "Exploring the distribution of income," *Monthly Labor Review*, December 1972, pp. 16–27.

[2] See Robert D. Plotnick, "Trends in Male Earnings Inequality," *Southern Economic Journal*, vol.48, no. 3, 1982, pp. 724–32; and Martin Dooley and Peter Gottschalk, "Earnings Inequality Among Males in the United States: Trends and the Effects of Labor Force Growth," *Journal of Political Economy*, vol. 92, no. 1, 1984, pp. 59–89.

[3] For example, see Kathryn L. Bradbury, "The Shrinking Middle Class," *New England Economic Review*, September–October, 1986, pp. 41–55; Gary Burtless, "Earnings Inequality Over the Business and Demographic Cycle," in Gary Burtless, ed., *A Future of Lousy Jobs?* (Washington, The Brookings Institution, 1990); and Frank Levy, *Dollars and Dreams: The Changing American Income Distribution* (New York, Russel Sage Foundation, 1987).

[4] See Barry Bluestone and Bennett Harrison, *The Great American Job Machine: The Proliferation of Low Wage Employment in the U.S. Economy*, Report to the Joint Economic Committee of the U.S. Congress, December 1986.

[5] See Marvin Kosters and Murray N. Ross, "The Influence of Employment Shifts and New Job Opportunities on the Growth and Distribution of Real Wages," in Phillip Cagan, ed., *Deficits, Taxes, and Economic Adjustments* (Washington, The American Enterprise Institute, 1987).

[6] See Chinui Juhn, Kevin M. Murphy, and Brooks Pierce, "Wage Inequality and the Rise in the Returns to Skill," version of a paper presented at a meeting of the Allied Social Science Association, December 1989.

[7] For a review of some of these methodological issues and of the literature in general, see D. J. Slottje, *The Struc-*

ture of Earnings and the Measurement of Income Inequality in the U.S. (Amsterdam, North-Holland, 1989).

[8] These earnings data are published in *Current Population Reports, Consumer Income*, Series P–60 (various issues). In addition, we analyze selected CPS microdata for different years. The CPS is a monthly survey of about 60,000 households selected to represent the Nation's population and designed to measure employment and unemployment. Each March, the CPS also collects information relating to the incomes and earnings of persons, families, and households in the previous calendar year. For more information, see any recent issue of *Current Population Reports, Consumer Income*, Series P–60.

Secondary sources of earnings data used in the analysis are from the Bureau of Labor Statistics, specifically, *Employer Cost Indexes and Levels, 1975–89*, Bulletin 2339, and the *National Survey of Professional, Administrative, Technical, and Clerical Pay, Private Nonservice Industries, March 1988*, Bulletin 2317 (and similar bulletins for earlier years and press releases).

[9] See Timothy Smeeding, "The Size Distribution of Wage and Nonwage Compensation: Employer Cost vs. Employee Value," in Jack Triplett, ed., *The Measurement of Labor Cost* (Chicago, University of Chicago Press, 1983).

[10] See Lee Lillard, James P. Smith, and Finis Welch, "What Do We Really Know About Wages? The Importance of Nonreporting and Census Imputation," *Journal of Political Economy*, June 1986, pp. 489–506.

[11] See Rudy Fichtenbaum and Hushang Shahidi, "Truncation Bias and the Measurement of Income Inequality," *Journal of Business and Economic Statistics*, July 1988, pp. 335–38.

[12] More formally, the Gini index can be written as

$$G = 1.0 - \sum_{i=1}^{N} f_i(Y_i + Y_{i-1})$$

where f_i is the proportion of earners in earnings interval i and Y_i is the proportion of total earnings received by earners in interval i and all lower intervals.

[13] For example, see Denny Braun, "Multiple Measurements of U.S. Income Inequality," *The Review of Economics and Statistics*, August 1988, pp. 398–405.

[14] The reason we calculated Gini indexes from grouped data instead of the actual sorted microdata was because the latter method is more costly. Calculating the measure from group data, however, results in an underestimate of the index. (The Census Bureau estimates that the Gini index for family income in 1986 was .387 based on grouped income data and .392 based on sorted microdata.) The underestimate occurs because calculation from group data uses Pareto-linear interpolation and integration procedures to obtain income quantiles underlying the index, and these techniques tend to underestimate the size of the income quantiles. One of the most difficult problems is estimating the mean income of each income interval and the mean of the open end. In the algorithm used by the Census Bureau, the midpoint of each interval is used as the mean; the mean of the open end is estimated by fixing an end point equal to twice the upper bound of the next-to-last interval and using Pareto interpolation.

[15] See Tom S. Sale, "Interstate Analysis of the Size Distribution of Family Income, 1950–1970," *Southern Economic Journal*, January 1974, pp. 434–41.

[16] The Gini indexes for the period 1978 to 1988 that appear in this article are not strictly comparable for a number of reasons. First, earnings intervals appearing in the *Current Population Reports, Consumer Income*, Series P–60, changed over this time span. In 1978, 18 earnings intervals were published, ranging from "under $1,000" up to "$25,000 and over"; between 1979 and 1987, 18 earnings intervals were published, ranging from "under $2,000" up to "$75,000 and over"; and in 1988, 21 intervals were published, ranging from "under $2,500" up to "$100,000 and over." Second, for 1985 and subsequent years, changes in the CPS questionnaire permitted the coding of actual earnings amounts between $100,000 and $299,999; previously, the highest earnings amount that could be coded was $99,999. This change allowed for the inclusion of a greater amount of aggregate earnings that otherwise would have gone undetected. And third, between 1987 and 1988, revisions were made to the processing system used on the CPS income data. The revisions involved the entire system, that is, imputations, edits, weighting, and other procedures affecting the creation of the 1988 income data file.

The impact of the interval changes and the modifications in processing between 1987 and 1988 on Gini indexes calculated from group data can be isolated because 1987 earnings data were processed and tabulated under both the old and the new procedure. Based on the old intervals and processing system, the Gini index for male full-time, year-round workers in 1987 was calculated to be .332; with the new processing system and new intervals, the comparable Gini in 1987 would have been .335. The impact of the changes in the questionnaire cannot be isolated as readily. We believe that, collectively, these changes do not seriously distort the basic trends that are presented and discussed.

[17] Comparisons of Gini indexes have been tested at the 90-percent level of confidence, as well as examined for Lorenz dominance.

[18] See McKinley Blackburn and David E. Bloom, "Earnings and Income Inequality in the United States," *Population and Development Review*, December 1987, pp. 575–609.

[19] These Gini indexes were also derived from grouped data using the Census Bureau methodology. There were 13 wage and salary intervals in 1948, 16 in 1958, 15 in 1968, 21 in 1978, and 21 in 1987.

[20] See, for example, Burtless, "Earnings Inequality."

[21] Burtless, "Earnings Inequality." Burtless shows that changes in the unemployment rate, as well as demographic influences (for example, the entrance of the baby boom generation into the labor force), had only a minor impact on earnings inequality as measured by the Gini index.

[22] Burtless, "Earnings Inequality."

[23] See Juhn, Murphy, and Pierce, "Wage Inequality."

[24] Earnings data by industry for 1988 were not yet published at the time this article went to press.

[25] These distributions are shown in Table 39 of the Census Bureau publication *Money Income of Households, Families, and Persons in the United States: 1987, Current Population Reports*, Series P–60, no. 162, pp. 158–65. Earnings data by detailed occupation for 1988 were not yet published at the time this article went to press.

[26] This finding is even more dramatic when we calculate the variance of the natural logarithm of annual earnings as our measure of earnings inequality: between 1982 and 1987, the variance of the logarithm of annual earnings in the administrators, officials, and sales occupations increased from .991 to 1.216; in all other occupations, it declined from .743 to .697.

[27] The Employment Cost Index measures the rate of change in compensation per hour worked. It includes both wages and salaries and employer costs for employee benefits. Like the Consumer Price Index, it uses a fixed "market basket" of compensation items paid to labor and therefore is regarded as an important indicator of employers' costs of employing labor. It is based on a probability sample of about 3,400 private nonfarm establishments. Data are collected each quarter for the pay periods that include the 12th of March, June, September, and December.

[28] *Business Week*, May 7, 1990, p. 56. This compensation includes salaries, bonuses, stock options, and other long-term compensation.

APPENDIX: A growing gap in the returns to education

One factor that was previously cited as being associated with growing earnings inequality is the widening gap in the returns to education. As one researcher has pointed out, a "marginal productivity-human capital" analysis would suggest that changes in earnings inequality should correspond to changes in the distribution of education.[1] That is, as the distribution of education becomes more equal, so should the distribution of earnings.[2] What has troubled many researchers recently, however, is that the statistics indicate just the contrary: the distribution of education, measured by the number of years of schooling an individual has completed, has become more equal, but the distribution of earnings has become more unequal.[3]

The implication of this development is that a gap has opened in the returns to education among groups classified according to educational level. Educational differences are diminishing, but earnings differences are becoming greater. In other words, the rate of return for well-educated workers has increased relative to the

Table A–1. **Estimated coefficients on *HIGHGRDE* for male full-time, year-round earners, by broad occupational and education groups, 1978, 1982, and 1987**

Group and education level	1978	1982	1987
Total	.079 (.002)	.087 (.002)	.093 (.002)
16 or more years	.074 (.011)	.094 (.009)	.104 (.009)
12 or fewer years	.066 (.003)	.067 (.004)	.069 (.004)
Administrative, official, and sales occupations	—	.100 (.005)	.100 (.005)
16 or more years	—	.087 (.020)	.073 (.019)
12 or fewer years	—	.078 (.016)	.030 (.019)
All other occupations	—	.082 (.002)	.088 (.002)
16 or more years	—	.113 (.010)	.136 (.010)
12 or fewer years	—	.064 (.004)	.071 (.003)

NOTE: The dependent variable is the natural logarithm of annual earnings; the universe is men who worked full time, year round; standard errors are in parentheses; dashes indicate data not available.

rate of return for less well-educated workers.

To further test whether this was indeed happening, the relationship was examined in the context of rising earnings inequality among male full-time, year-round workers. Rough estimates were made of the rates of return to earners with college educations or more and earners with high school educations or less using the basic human capital model developed by Mincer.[4] The specification of the model is written as

$$\ln E = \beta_0 + \beta_1 * HIGHGRDE + \beta_2 * EXP + \beta_3 * EXPSQ + \mu,$$

where the dependent variable, $\ln E$, represents the natural logarithm of annual earnings; β_0 is an intercept term; $HIGHGRDE$ denotes the highest year of school completed; EXP is an experience variable (defined as age minus highest year of school completed minus 6); $EXPSQ$ is the square of the experience variable, included to account for the gradual erosion of skills; and μ is an error term.

The model was fit to data for all men who worked

full time, year round in 1978, 1982, and 1987.[5] In general, the coefficients of determination were low (the complete results of the regressions are available from the authors), but the coefficients on the independent variables, in nearly all instances, were highly significant and of the expected signs. The coefficient on *HIGHGRDE* represents the percentage change in annual earnings for a unit change of years of school completed, our proxy for the returns to education.

Table A–1 contains the estimated coefficients on the variable *HIGHGRDE*, with their accompanying standard errors in parentheses. Our estimates indicate that the overall rate of return to education for male full-time, year-round workers did rise between 1978 and 1987, from 7.9 percent to 9.2 percent. More importantly, there does appear to be a widening in the rates between broad educational groupings. For those with a college education, the coefficients rose from 7.4 percent to 10.4 percent, while for those with a high school education or less, the coefficients only increased from 6.6 percent to 6.9 percent (not a statistically significant change). Despite their crudeness, these results support the view that, for whatever the reason or reasons, a gap developed in the returns to education among men with different levels of schooling during the 1980's.

When this analysis is extended to men employed as administrators, officials, and sales workers and to men employed in all other occupations, further evidence appears of the connection between widening returns to education and growing earnings inequality.[6] As shown in table A–1, a gap in the returns to education developed among workers in managerial and sales occupations between 1982 and 1987. Moreover, among workers in all other occupations, a gap in the returns to education was evident in *both* years, and it was only slightly larger in 1987 than in 1982. These findings are fairly consistent with what happened to earnings inequality in each group: earnings inequality among male administrators, officials, and sales workers increased significantly, and earnings inequality among workers in all other occupations combined increased also, but not in a statistically significant manner.

Footnotes

[1] See Barry Bluestone, "The Impact of Schooling and Industrial Restructuring on Recent Trends in Wage Inequality in the United States," *Papers and Proceedings of the 102nd Annual Meeting of the American Economic Association*, May 1990, p. 304.

[2] One could argue about the degree of correspondence in the relationship: among the many reasons why the correspondence may not be precise are that the quality of formal education can vary dramatically, the absorption of learning can vary from person to person, and formal education is not the only way productivity-enhancing qualities can be acquired.

[3] We calculated, from unweighted microdata, the variance on "highest grade of school completed" and the variance on the natural logarithm of annual earnings for male full-time, year-round workers for 1978 and 1987. The variance on the education measure decreased from 9.61 to 8.77 (the mean rose from 12.6 years to 13.2 years), while the variance on the earnings measure increased from .692 to .830.

In our calculations, we used CPS microdata for 1987 instead of 1988 because changes made to the CPS processing system between those 2 years had a significant effect on the variance of the natural logarithm of annual earnings. Using the old processing system on data for 1987, we found that the variance of the logarithm of annual earnings for male full-time, year-round workers was .830; by contrast, using the new processing system on the data produces a variance of .715. (The variance for this group in 1988 under the new processing system was .665.)

[4] See Jacob Mincer, *Schooling, Experience, and Earnings* (Washington, National Bureau of Economic Research, 1974).

[5] We chose not to apply Mincer's model to women's earnings because of the greater likelihood that a woman's work experience will be discontinuous.

[6] Administrators and officials here include not only those who were salaried, but also those administrators and officials who were self-employed.