Changes in the Structure of Wages: A Regional Comparison

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Several authors have documented dramatic changes in the structure of wages in the United States in the 1980s.[1] Specifically, their findings have shown a trend of rising returns to skill. Skill, as discussed here, refers to those human capital characteristics most relevant to the productivity of labor: education and experience.

During much of the post-World War II period, the structure of men's wages (the relative returns to different levels of skill) remained remarkably stable. A break with past experience first occurred in the 1970s. In that decade, the earnings of young, college-educated males declined precipitously relative to the earnings of their less skilled counterparts (Freeman 1976, 1977, 1978). The collapse of the relative wage structure in the 1970s lent itself to a simple unified explanation: large baby-boom cohorts flooded labor markets with the most educated young males the United States had up to then witnessed. The declines in the returns to skill were thus well explained by the large shifts in the relative supplies of young male college graduates.[2]

The more recent twist in the structure of wages, a reversal of the experience of the 1970s with a sharp rise in the returns to college education, has intrigued economists because of its magnitude and because of economists' inability to identify one primary overarching explanation. The changes in the 1980s cannot, for instance, readily be attributed to changes in the relative supplies of skill groups. Despite the cresting of the baby boomers' entry into the labor markets, the U.S. trend toward an ever more educated labor force has proceeded. With the absorption of the baby-boom cohorts, the trend is also toward an older, and presumably more experienced, labor force. The experience of the 1980s portends significant economic consequences, as already manifested in the "good jobs, bad jobs" debate and concerns over "the vanishing middle class."[3]

This article focuses on changes in the structure of men's wages in the 1980s.[4] Its purpose is to document the rising returns to skill in the

nine U.S. census regions.[5] The regions differ considerably in the composition of their labor forces, their industrial structures, and their economic experiences. As all these factors have a bearing on the wage structure, the changes were not likely to have been uniform across all regions, or homogeneous in their sources. Examining the interregional variation in wage structures may shed some light on the relevant forces at play.

The article has five sections. Section I documents the changes in regional wage structures between 1979 and 1988, using estimates of the returns to various skill levels based on Current Population Survey (CPS) data. Section II examines how shifts in industrial and occupational patterns provide a partial explanation of the observed changes. Section III considers as potential explanations both technological change and "outsourcing," defined here as shifts of production to low-wage areas, focusing on the manufacturing industry. Section IV considers regional variations in the relative supply of and demand for different skill levels. The final section draws conclusions.

I. Changes in Regional Wage Structures

The CPS data analyzed in this study provide information on individuals' income, education, and other demographic and labor market characteristics. To characterize the changes in the structure of wages, each individual observation was first classified into one of four education groups and one of five potential experience groups. (Details of the data and methodology may be found in the Appendix.) The education groups corresponded to individuals possessing less than 12 years of education (dropouts), 12 years (high school graduates), 13 to 15 years (some college), and those with 16 or more years (college graduates).

Individuals' hourly wages were calculated, in log form, from their annual income, number of weeks employed, and average number of hours worked per week. The resulting wage data were then analyzed using "hedonic" log-wage regressions. The basic regression model, Model I, estimates the hourly wages as a function of dummy variables corresponding to each education and potential experience class (the human capital variables) and other demographic variables thought to explain the distribution of wages. Separate regressions were run for 1979 and 1988 for each of the nine census regions, as well as for the United States as a whole.[6] The coefficients of the human capital variables provide estimates of the returns to a given level of either education or potential experience, all else being equal. These coefficients are reported in Appendix Table A1 and are presented in a more intuitive manner in Table 1, which shows the wages of one education group relative to another. The rising returns to education, and to college education in particular, are apparent.

In the United States the ratio of male college

Table 1
Relative Wages of Men and the Changes between 1979 and 1988

	College/Dropout Wage		Percentage Point	College/High School Wage		Percentage Point	High School/ Dropout Wage		Percentage Point
Region	1979	1988	Change	1979	1988	Change	1979	1988	Change
United States	1.65	1.89	24	1.32	1.53	21	1.24	1.24	0
New England	1.75	1.80	5	1.42	1.51	9	1.23	1.19	−4
Middle Atlantic	1.75	1.92	17	1.45	1.60	15	1.21	1.20	−1
East North Central	1.51	1.76	25	1.29	1.46	17	1.16	1.21	5
West North Central	1.54	1.75	21	1.26	1.46	20	1.23	1.20	−3
South Atlantic	1.77	1.97	20	1.41	1.62	21	1.26	1.22	−4
East South Central	1.58	1.86	28	1.21	1.51	30	1.31	1.23	−8
West South Central	1.69	1.99	30	1.36	1.53	17	1.24	1.30	6
Mountain	1.53	1.82	29	1.25	1.45	20	1.23	1.26	3
Pacific	1.55	1.88	33	1.24	1.48	24	1.25	1.26	1

Note: Footnote 7 explains how relative wages are calculated from the coefficients of the model I log–wage regression.
Source: Appendix Table A1 and author's calculations.

graduates' wages to the wages of high school graduates (college/high school wage) rose from 1.32 to 1.53 between 1979 and 1988 and the ratio of college graduates' wages to the wages of men who had not completed high school (college/dropout wage) rose from 1.65 to 1.89.[7] By contrast, the wage differential between high school graduates and dropouts remained roughly the same. In other words, the return to a college education increased in the 1980s, not the return to education generally.[8]

The rising returns to education, and to college education in particular, are apparent.

A similar pattern occurred in all nine of the census regions, with the returns to college graduates rising relative to both dropouts and high school graduates. These increases varied considerably, however. The increases in the college/dropout wage ranged from a notably low 5 percentage points in New England to the 33 percentage point jump in the Pacific states. The rise in the college/high school wage ranged from the low 9 percentage point gain experienced in New England to the 30 percentage point increase in the East South Central region.[9]

Changes in relative wages can be attributable to changes in the relative supplies of various skill groups, changes in relative demands for these skills, or institutional changes in the labor markets. The increasing returns to skill in the 1980s have given rise to several possible explanations. Of these, the most promising include shifts in product demand, skill-biased technological change, and shifts in production to low-wage areas (outsourcing), all demand-side hypotheses. In the next two sections the data are analyzed for evidence conforming to the predictions arising from these hypotheses.[10]

II. Industry and Occupation Shift Effects

One of the more plausible explanations for the rise in returns to skill in the 1980s is shifts in product demand. Murphy and Welch (1989) in particular champion this explanation, emphasizing the role of international trade. The product demand shift explanation begins by recognizing that the distribution of human capital is not uniform across industries. Some industries employ more highly educated labor than others. Some industries, manufacturing and construction being the most obvious, rely less on ability gained through formal education and more on skills acquired through apprenticeship or on-the-job training.

Murphy and Welch posit that the unprecedented trade deficits of the 1980s reflected shifts in product demand that adversely affected industries employing disproportionately large numbers of less educated workers. The most notable example is the manufacturing sector, where a flood of imports contributed to a contraction of employment. The adverse shifts in the relative demand for the less educated in manufacturing spilled over to other labor markets so the net effect was a decline in overall relative demand.[11]

The effects of the trade deficits in the 1980s as interpreted by Murphy and Welch are closely linked with the "good jobs, bad jobs" debate. Manufacturing has historically been a high-wage industry. Thus, the relative (and absolute) decline of employment in manufacturing constrained what had been the primary sector where less educated workers could obtain wages comparable to those of their more educated counterparts (partially as a result of union wage bargaining). Not only were the returns to the less educated affected by the decline in the relative demand for this skill group, but also the employment opportunities available to the less educated were subsequently more concentrated in lower-wage industries, the services industries in particular.

The shifts in employment between industries could therefore explain at least part of the increasing returns to skill witnessed in the 1980s. This shift in industrial structure from manufacturing to services, while a trend nationwide, has varied in magnitude among regions. One could logically expect the industry shift hypothesis to prove more fruitful in some regions than others. And to the extent that the changes in the sectoral distribution of employment were the result of product demand shifts, measuring the effects of industry shifts on the wage structure provides a proxy for the effects of product demand shifts, although not testing for the latter directly.

Industry Shifts

Blackburn, Bloom, and Freeman (1989b) tried to isolate the industry shift effect by forcing the returns to industry affiliation to remain constant while ac-

counting for changes in industry affiliation. This study performs a similar test at the regional level. The test involves pooling the data from the two CPS cross-sections, 1979 and 1988. Shifts in employment between sectors are controlled for by the inclusion of dummy variables denoting industry affiliation. (See the Appendix, Section II, for details.) The resulting model, Model II, yields estimates of the returns to education in the study years after accounting for the movement of labor between sectors, but holding relative sectoral wages constant. If industry shifts explain part of the changes in the wage structure, the estimated returns to education generated by Model II should be smaller than those resulting from Model I.

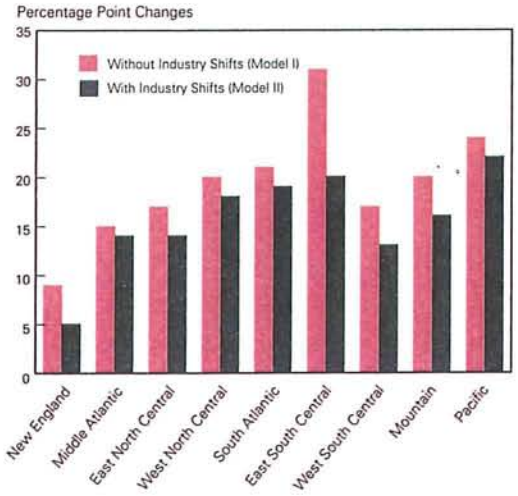
Figure 1 compares the percentage point increases in the college/high school wages generated by Model II with those produced by Model I.[12] Industry shifts do, indeed, appear to explain some of the increase in the returns to college graduates. The increases in the college/high school wages are smaller in all regions when industry affiliation is taken into account.[13] Industry shifts appear to have been particularly important in the East South Central region, accounting for a large fraction of a very large increase in the college/high school wage. Industry shifts also explain a sizable portion of the changes that occurred in New England, but the absolute magnitude of these effects was smaller than in other regions.

The proportion of the changes in the wage differentials explained depends not only on the sheer movement of labor between industries but also on the differences in returns to skill between industries. If labor moves between two low-wage industries, such a shift would contribute little to the change in relative wages. On the other hand, if employment shifts from the high-wage manufacturing sector to the low-wage retail sector, one would expect a more sizable impact on relative wages. Indeed, in the East South Central region, the higher-wage manufacturing, construction, and transportation, communications and utilities industries all lost employment shares, while the low-wage retail sector expanded its share of male employment faster than in any other region. In New England, the share of male employment in manufacturing shrank more than in most regions, but the growth of the construction sector and the transportation, communications and utilities sector (also high-wage) was by far the greatest in the nation.[14] Therefore, while industry shifts seem to explain a considerable portion of the changes in wage differentials in New England, the overall magnitude of the changes was small, possibly because of alternative

Figure 1

Changes in College/High School Relative Wages of Male Workers, 1979 to 1988, Without and With Industry Shifts

(A Comparison of Models I and II)



Source: Table 1, and author's calculations as described in the Appendix.

high-wage employment opportunities for the less educated.

The point remains, however, that industry shifts appear to have contributed to the rising returns to skill, with the contributions across the nine regions ranging from almost negligible to quite substantial. Where industry shift effects explain little, within-industry effects should be examined.

Within-Industry Effects

Within-industry effects include changes in the average wages of a given sector. These may result from product demand changes that affect an industry's profitability, or from changes in the industry's wage-setting institutions.[15] The decline of union membership (and thus, presumably, workers' bargaining power) in the 1980s is a prime example of the latter. Wage concessions granted by work forces in the 1980s, in response to declining international competitiveness or other factors adversely affecting profitability and employment, may have contributed to changes in labor's share of industry rents (average industry wages).

To analyze the contribution of within-industry

Table 2
Relative Wages of Men and the Changes between 1979 and 1988, Taking Account of Industry and Occupational Effects

Region	College/Dropout Wage		Percentage Point Change	College/High School Wage		Percentage Point Change	High School/ Dropout Wage		Percentage Point Change
	1979	1988		1979	1988		1979	1988	
United States	1.48	1.55	7	1.26	1.34	8	1.17	1.16	−1
New England	1.48	1.43	−5	1.29	1.27	−2	1.15	1.13	−2
Middle Atlantic	1.40	1.64	24	1.25	1.42	17	1.13	1.15	2
East North Central	1.46	1.52	6	1.28	1.32	4	1.14	1.16	2
West North Central	1.44	1.44	0	1.26	1.28	2	1.14	1.13	−1
South Atlantic	1.48	1.59	11	1.25	1.40	15	1.18	1.14	−4
East South Central	1.49	1.50	1	1.21	1.32	11	1.23	1.14	−9
West South Central	1.48	1.65	17	1.30	1.37	7	1.14	1.20	6
Mountain	1.42	1.49	7	1.26	1.30	4	1.13	1.14	1
Pacific	1.36	1.45	9	1.17	1.29	12	1.16	1.13	−3

Note: Footnote 7 explains how relative wages are calculated from the coefficients of the model III log–wage regression.
Source: Appendix Table A2 and author's calculations.

effects, industry and occupation affiliation variables were added to Model I to arrive at Model III. The addition of these variables will account for industry shift effects but, in contrast to the analysis performed with Model II, the coefficients of the industry variables are allowed to vary between 1979 and 1988. The coefficients for the human capital variables are presented in Appendix [1]Table A2 and the estimated changes in the college/high school wage are shown in Table 2.

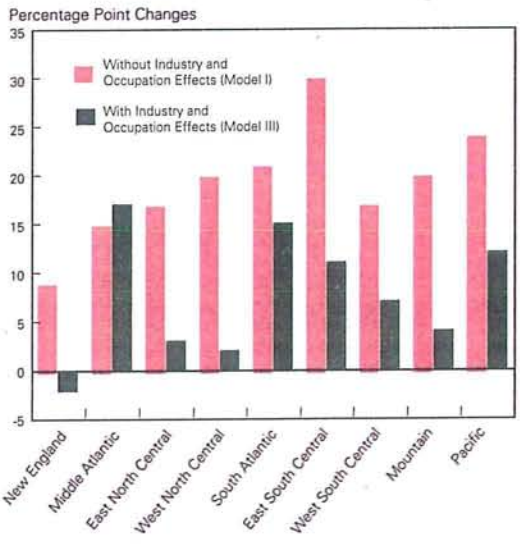
Most of the patterns obtained previously remain intact: an increase in the returns to skill (both education and potential experience) and a rise in the relative wages of the most educated. The inclusion of industry and occupation variables, however, significantly reduces the magnitude of the changes in the college/high school and college/dropout wages. The increase in the college/high school wage in the United States diminishes to 8 percentage points (compared to the 21 percentage point increase in Model I) while the college/dropout wage increases only 7 percentage points (compared to 24 percentage points). Clearly, the combination of shifts among industries and occupations and changes in the returns to various industries and occupations explain much of the increasing returns to a college education.

Nevertheless, as can be seen from Figure 2, the ability of industry and occupation variables to account for a portion of the changes in the wage

Figure 2

Changes in College/High School Relative Wages of Male Workers, 1979 to 1988, Without and With Industry and Occupation Effects

(A Comparison of Models I and III)



Source: Table 1, and author's calculations as described in the Appendix.

differentials fluctuates among regions. The addition of these variables, for example, eliminates most of the increase in the returns to college education in the East North Central and West North Central regions, but explains comparatively little of the changes in the South Atlantic states and seemingly none of the change in the Middle Atlantic region.

Curiously, in New England the addition of the industry and occupational variables actually reverses the direction of changes in the returns to education. In this region, the returns to all three education groups (high school, some college, and college graduates) *fell* relative to the earnings of dropouts. The college/high school wage, which in 1979, at 1.29, was higher than the U.S. ratio, fell to 1.27 in 1988, yielding the lowest relative wage of all regions (Table 2). These results suggest that the relatively high average wages enjoyed in New England in the 1980s were not the result of relatively greater returns to education and may reflect the high level of economic activity.

III. Technological Change and Outsourcing

Two alternative explanations competing with (but not mutually exclusive of) product shifts are technological change and outsourcing to other regions and abroad. Technological change as an explanation refers to the possibility that production processes in recent years favored intellectual over, say, physical skills. An example of this would be the widespread adoption of computers in the workplace, a technology hypothetically biased in favor of the more educated. Thus, in competitive labor markets, where labor is remunerated according to its marginal product, the net effect of education-biased technological change would be a shift in relative wages favoring the most educated workers.

"Outsourcing" and technological change are both consistent with disproportionate losses of job opportunities among less educated workers within a given industry.

"Outsourcing," as used here, refers to U.S. firms shifting production to low-wage areas (which may include regions of the United States).[16] Anecdotal evidence for this explanation abounds in the manufacturing sector. The rise of the "maquiladora" facilities across the border in northern Mexico, the shift in production of computer components to the Asian "Newly Industrialized Countries," and the domestic decrease in the number of production relative to non-production workers in the manufacturing sector are all phenomena conforming to the notion of outsourcing.

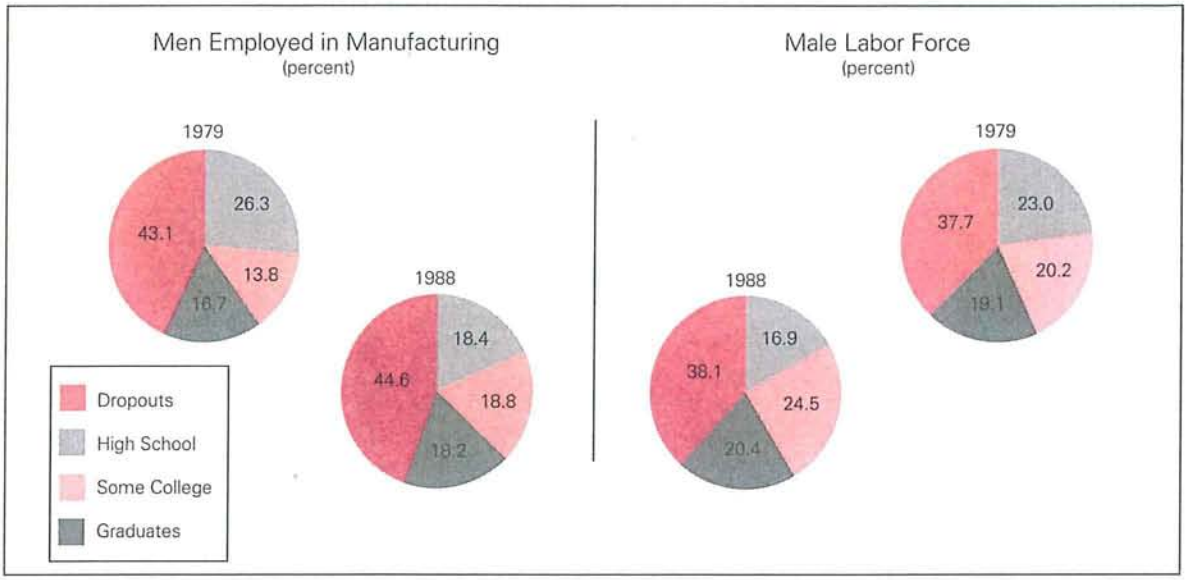
Outsourcing and technological change are considered jointly here because data supporting one hypothesis also tend to support the other. Both are consistent with disproportionate losses of job opportunities among less educated workers within a given industry. These losses would then spill over into other sectors causing a relative demand shift, in aggregate, against the less educated. Both explanations are thus associated with increases in the relative wages of the more educated.

In considering the two hypotheses, the focus remains the male labor force and the changes occurring in a single sector: manufacturing. One indication that the changes occurring in manufacturing have favored the most educated is a shift toward a more educated work force. As can be seen in Figure 3, the fraction of U.S. men employed in manufacturing who were college graduates rose from 13.8 percent in 1979 to 18.8 percent in 1988, while dropouts' share of the manufacturing work force fell from 26.3 percent to 18.4 percent. These shifts were somewhat larger than those occurring in the total male labor force. The shift to a more educated manufacturing work force took place all across the country; in most regions, the increase in the education level in manufacturing exceeded that in the total labor force (Table 3). The experience in the manufacturing sector, in sum, supports popular perceptions of disproportionately large employment losses among the least educated. This pattern, furthermore, is in agreement with the concepts of outsourcing and technological change favoring the more educated.[17] Variations among regions raise the possibility of distinguishing between the two.

The concept of outsourcing manufacturing production to lower-wage locations would predict the following effects: (1) higher-wage regions within the United States would see their share of U.S. manufacturing jobs decline while lower-wage regions would gain; (2) this shift would be more pronounced for less

Figure 3

Educational Level of U.S. Male Workers, 1979 and 1988



Source: U. S. Bureau of the Census, *Current Population Survey,* 1980 and 1989.

Table 3

Changes in the Composition of the Male Work Force by Years of Education, 1979 to 1988

Percentage Points

	Total Male Work Force Years of Education				Manufacturing Years of Education			
Region	<12	12	13–15	16+	<12	12	13–15	16+
United States	−6.0	.5	1.3	4.3	−7.9	1.5	1.5	5.0
New England	−8.1	.5	1.8	5.7	−8.2	.8	.5	6.9
Middle Atlantic	−7.1	.4	.7	6.0	−7.4	1.7	.5	5.2
East North Central	−6.6	.2	2.5	4.4	−7.8	−.6	3.0	5.4
West North Central	−7.0	.2	1.0	5.8	−9.0	7.3	−4.9	6.5
South Atlantic	−7.9	3.2	.8	3.9	−10.2	6.3	1.3	2.6
East South Central	−9.1	5.0	1.5	2.7	−12.1	4.8	2.1	5.2
West South Central	−6.0	−1.0	2.0	5.0	−10.0	2.3	−.4	8.1
Mountain	−1.8	−.5	.9	1.4	−1.3	.5	−5.6	6.4
Pacific	−1.2	−.9	.2	2.0	−6.0	−.4	4.4	2.0

Source: U.S. Bureau of the Census, *Current Population Survey,* 1980 and 1989, and author's calculations.

educated workers, who are concentrated in production (rather than management, R&D, sales or general support); and (3) these differential shifts would be reflected in college wage premiums, with the returns to college education increasing more in the higher-wage regions that were losing manufacturing jobs.

As can be seen from Table 4, shifts in overall manufacturing employment provide some support for the first element in this chain. Three regions, New England, the Middle Atlantic, and the East North Central, saw their shares of U.S. manufacturing employment decline. All three had manufacturing wages above the national average in 1988.

When the focus turns to the shifts among dif-

Table 4
Changes in Regional Shares of U.S. Manufacturing Employment by Education Group between 1979 and 1988, and Relative Manufacturing Wages in 1988

	Percentage Point Changes in Share of U.S. Manufacturing Employment					Relative Wages (U.S. = 100)
Region	All	Dropouts	High School	Some College	Graduates	1988
New England	−.9	−1.0	−.9	−1.3	−1.1	109.4
Middle Atlantic	−3.0	−2.6	−3.0	−3.2	−3.6	107.8
East North Central	−3.9	−4.0	−5.7	−1.7	−1.1	107.8
West North Central	.3	−.6	1.2	−2.1	.9	92.7
South Atlantic	3.0	3.4	4.4	2.7	1.1	92.3
East South Central	0	−.3	.6	.3	.8	87.5
West South Central	1.3	.9	1.4	.5	2.8	91.9
Mountain	1.1	1.4	.9	.3	1.3	93.3
Pacific	2.0	2.8	1.2	4.5	−1.0	100.2

Note: Wages were calculated from the average log wages for each region and U.S. sample.
Source: U.S. Bureau of the Census, *Current Population Survey*, 1980 and 1989, and author's calculations.

ferent education groups, support for the outsourcing hypothesis weakens. In the Middle Atlantic states and New England, the loss of manufacturing jobs was not concentrated among the least educated, as outsourcing would suggest. The Middle Atlantic states and New England experienced bigger declines in their shares of U.S. college graduates employed in manufacturing than in their shares of total manufacturing employment. Among the regions gaining manufacturing share, the West South Central experienced a much larger increase in its share of highly educated manufacturing workers than in its share of total manufacturing employment. Only the East North Central and South Atlantic regions seem to fit the regional outsourcing explanation. The employment losses in the East North Central were disproportionately among the less educated, while the employment gains in the South Atlantic were concentrated in this group.

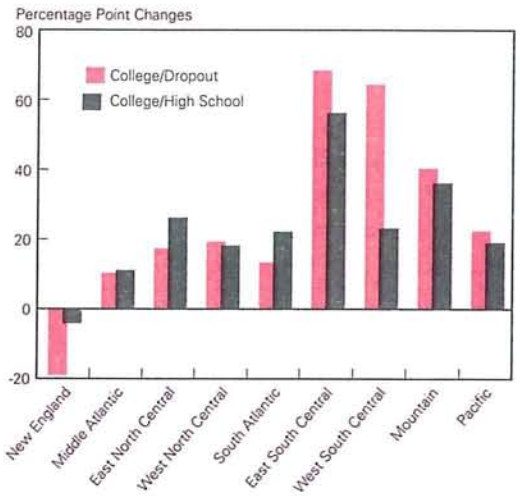
To test the final element in the outsourcing argument, Model I was applied to data on males employed in the manufacturing sector. The results of these regressions show a familiar pattern: the returns to college graduates increased in the United States and in eight of the nine regions (Appendix Table A3). The sole exception was New England. A comparison of Figure 4 with Figure 1 reveals that the increases in the college graduate wage premiums varied more for manufacturing than total employment. The increase in the college/high school wage for all industries, measured by Model I, ranged from 9 percentage points in New England to 30 in the East South Central. In the manufacturing sector, changes in the college/high school wage ranged from a 9 percentage point decline in New England to a 56 percentage point increase in the East South Central region. Such results suggest that the forces behind the changes in the wage structure operated more powerfully on the manufacturing sector than on the economy as a whole, or that different or additional forces were at work in manufacturing.

Do these results support the concept of outsourcing in manufacturing? If outsourcing between regions were a major factor, one would expect to find greater than average increases in college premiums in the regions that lost shares of manufacturing employment (New England, the Middle Atlantic, and the East North Central). Instead, the college/high school wage in manufacturing fell in New England and increased less in the Middle Atlantic states than in those regions whose share of U.S. manufacturing employment increased. Once again, only the East North Central region seems to fit a regional outsourcing explanation. Here the college/high school wage increased somewhat more than average.

Outsourcing to foreign countries might still account for the changes in the wage structure, even if outsourcing from high-wage to low-wage regions does not. The decreases in dropouts' shares of manufacturing employment support this notion. These losses were generally greater than the losses occurring in other industrial sectors. As most other sectors

Figure 4

Changes in College/Dropout and College/High School Relative Wages in Manufacturing, 1979 to 1988



Source: Table A3, and author's calculations as described in the Appendix.

are much less actively involved in trade and have limited capability to shift operations overseas, this pattern is in accordance with possible outsourcing to other nations.

Technological change is another possible explanation of the changes occurring in the manufacturing sector. The shifts in manufacturing employment toward greater reliance upon the more educated were substantially greater than comparable changes in the male labor force, and are consistent with a story of education-biased technological change. This is further supported by the sharp rise in the returns to education in the manufacturing sector. That such changes were generally greater in manufacturing than in the economy as a whole would imply that education-biased technological change was more prevalent in that sector. Perhaps competitive pressures associated with the trade deficit caused new technologies to be adopted more rapidly in manufacturing. Perhaps the new technologies were simply more easily implemented in manufacturing. If technological change can occur unevenly, however, many sectoral and regional patterns can be compatible with its influence and its value as an explanation is compromised.

IV. Demographics and Relative Supply Changes

The declines in returns to education that occurred in the 1970s were, as previously mentioned, largely attributable to the increases in the relative supply of college-educated individuals as the baby-boom cohorts entered the labor market. It is only natural, then, to look to the supply side for some explanation of the increasing returns witnessed in the 1980s.

Unlike the demographic phenomena of the 1970s, however, no clear-cut supply-side explanation can be made for the changes that took place in the 1980s. On the most elementary level, the evidence confounds the issue, as the educational attainment of the labor force continued to rise. The percentage of the labor force with less than 12 years of education declined and the percentage with more than 16 years (college graduates) increased in all nine regions. Moreover, with respect to the college/high school wage differential, the increases in the college graduate share of the labor force exceeded the increases in the high school graduate share in all regions except the East South Central.

However, the increasing returns to college have reportedly been greatest among young males, and a comparison of these increases with changes in the supply of college educated young men suggests that supply factors did make some contribution. A regression using Model III but with the sample limited to males with one to ten years of potential experience (henceforth referred to as "young males") corroborates the large relative wage gains of young college graduates. The returns to education are presented in Appendix Table A4 and the changes in the college/high school wage are shown in Table 5.

In the United States, the college/high school wage for young males increased nearly 12 percentage points, versus the roughly 8 percentage point increase among all males. The differences at the regional level were in some cases much greater, in others surprising. The college/high school wage among young males in the East North Central region increased 22 percentage points, while among all males the college/high school wage increased only 3 percentage points. The East South Central region, meanwhile, was surprising in that the college/high school relative wage increased over 11 percentage points among all males yet declined by 25 percentage points among the least experienced.

Katz and Revenga (1989) argue that slower

Table 5

Ratio of College to High School Graduates among Young Males[a] and All Males in the Labor Force and the Change in the College/High School Wage, 1979 to 1988

Region	Male Labor Force	College/High School Graduates 1979	College/High School Graduates 1988	Percentage Point Change in College/High School Wage
United States	Young:	.58	.64	12
	All:	.54	.64	8
New England	Young:	.67	.83	1
	All:	.65	.79	−2
Middle Atlantic	Young:	.66	.72	21
	All:	.52	.66	17
East North Central	Young:	.47	.58	22
	All:	.42	.53	3
West North Central	Young:	.54	.66	1
	All:	.45	.58	2
South Atlantic	Young:	.54	.63	2
	All:	.55	.61	15
East South Central	Young:	.47	.48	−25
	All:	.42	.43	11
West South Central	Young:	.51	.54	19
	All:	.51	.66	7
Mountain	Young:	.65	.52	20
	All:	.64	.69	4
Pacific	Young:	.77	.77	21
	All:	.79	.87	12

[a]"Young Males" refers to those with 1 to 10 years of potential experience.

Source: U.S. Bureau of the Census, *Current Population Survey*, 1980 and 1989; Appendix Tables A2 and A4; and author's calculations.

growth in the numbers of U.S. male college graduates partly explains the rising returns to education among younger males. And as can be seen from Table 5, the ratio of college graduates to high school graduates did not increase as much for young males (.58 to .64) as it did for all males (.54 to .64).

At the regional level as well, some of the difference between the experience of young males and that of all males seems attributable to changes in the supply of college graduates relative to high school graduates. In five of the nine regions, the ratio of college graduates to high school graduates did not increase as much for young men as it did for all men; and in four of these five regions, the increase in the college/high school wage was greater for the younger group (Table 5). Moreover, in the West South Central and Mountain regions, where the disparity between the educational gains of all men and those of younger men was largest, the college wage premium increased much more for younger men. The experience of the South Atlantic also tends to support the notion of labor supply effects: the increase in the ratio of college graduates to high school graduates was larger for young men than for all men and the college wage premium increased much more modestly for younger men than for all men.

While differences in the relative supplies of college graduates appear to fit some of the changes in relative wages, in a few cases they complicate the issue. In the East North Central region, the ratio of college graduates to high school graduates increased similarly for young males and all males. Despite this similarity, the college wage premium increased much more for younger workers. The experience of the East South Central states was also puzzling. Here, the ratio of college graduates to high school graduates increased only slightly among both younger men and all men. However, the college wage premium rose for all men, while it fell for the youngest group.

The bottom line remains that changes in the relative supplies of college graduates cannot by themselves explain the increases in the relative wages of the most educated. Relative demand shifts must have occurred over the period, at times overwhelming the effects of supply changes. This, in fact, was the conclusion reached by Murphy and Welch (1988) in a very detailed study of relative demand changes and subsequently corroborated by other authors.

Unemployment Rates

Unemployment rates offer one informal means of representing the interactions between relative demands and supplies. At the national level, the relative availability of college graduates increased. The unemployment rates for college and high school graduates were roughly the same in 1988 as 1979, however. This suggests that the shift in relative demand for college graduates kept pace with their increase in relative supply.

The stability at the national level masks striking differences among the regions, as can be seen in Table 6. In four regions, unemployment rates increased among both high school and college graduates. In the West South Central and Mountain states, these increases were substantial and fairly similar.

In the East South Central and West North Central regions, the percentage point increases were considerably larger for high school graduates than college graduates, indicating that while demand grew more slowly than supply for both groups, college graduates were favored. In the South Atlantic and Pacific regions, college graduates were again favored as unemployment rates fell for them and increased for high school graduates. And in the Mid Atlantic, unemployment rates fell for both groups, but more for college graduates.

In New England and the East North Central region, unemployment rates for high school graduates fell while rates increased for college graduates. Here it would seem that relative demand shifts favoring college graduates did not outweigh the expansion in the relative supply of college graduates. New England was also the only region in which the college wage premium did not increase in the 1980s, after taking into account industry and occupation effects. The general decline in New England's unemployment rate suggests, however, that this result was due more to a strong demand for high school graduates than to weak demand for college graduates.

Can the changes in unemployment rates explain the changes in the relative wages across the regions? In other words, can the changes in unemployment rates proxy for supply and demand shifts, reconciling the changes in both? The Phillips curve literature postulates an inverse relationship between changes in wages and unemployment rates, with higher unemployment rates associated with slower wage growth. If high school and college graduates could not be substituted in the workplace, a Phillips curve type of relationship could be estimated for each skill group independent of the other. Of course, there is substitutability, though less than perfect, between skill groups. The wage of each skill group should therefore depend not only on its own unemployment rate but also, at the margin, on that of the other skill group.

Accordingly, regional changes in relative wages were related to changes in the unemployment rates for high school and college graduates. Specifically, changes in the college/high school wage were assumed to be an inverse function of the changes in college and high school graduate unemployment rates. The college/high school wage should increase in response to a decline in the unemployment rate for college graduates. A decline in the unemployment rate for high school graduates, on the other hand, should be associated with an increase in the high school graduate wage and, thus, a decline in college/high school wage.

This relationship was estimated using a simple ordinary least squares method (Table 7). The esti-

Table 6
Changes in U.S. and Regional Unemployment Rates for Men, 1979 to 1988

		All	Dropouts	High School	Some College	Graduates
Unemployment Rate						
United States	1979	13.7	19.5	15.1	12.1	6.1
United States	1988	13.0	19.7	15.4	11.2	6.0
Percentage Point Change in Unemployment Rate, 1979–88						
United States		−.7	.2	.3	−.9	−.1
New England		−3.3	−7.0	−2.6	−4.0	.9
Middle Atlantic		−1.5	−1.7	−.9	2.3	−2.0
East North Central		−2.2	−1.1	−1.3	−3.3	.5
West North Central		1.1	3.9	2.4	1.2	.4
South Atlantic		−1.5	−3.5	.3	1.0	−1.5
East South Central		1.8	1.3	3.8	3.0	1.1
West South Central		3.1	6.5	3.5	2.1	3.9
Mountain		3.7	7.8	3.5	3.2	2.9
Pacific		−1.6	.7	.5	−4.6	−1.9

Note: These unemployment rates are significantly higher than those normally published, as they represent a summation of all individuals experiencing any unemployment in a given year.
Source: U.S. Bureau of the Census, *Current Population Survey*, 1980 and 1989, and author's calculations.

mated coefficients are plausibly signed and the changes in the two unemployment rates appear to explain a portion of the changes in relative wages. These results suggest that a more rigorous analysis would show that, while supplies of more educated men were increasing, demand shifts favoring the more educated were even greater, producing the rising returns to education witnessed in the 1980s.

V. Conclusions

This study set out to examine changes in the structure of men's wages in the 1980s on a regional basis. The analysis corroborates evidence presented by other authors of a rising return to skill in the United States during the decade. It has also demonstrated that the experience of a changing wage structure has not been uniform across regions. The wages of college graduates rose in all regions relative to the less educated, but to varying extents and perhaps for different reasons. Both demand and supply shifts were sufficiently varied between regions to cause sizable differences in the movement of relative wages.

Changes in industry employment patterns (shifts between sectors) appear responsible for some of the increases in relative wages, again to a differing degree among the regions. The rise in the wages of the most educated, relative to the less educated, is smaller when changes in industry affiliation are accounted for. Changes within industries, in occupational patterns, and in returns to occupations also contributed to changes in the returns to education in all regions.

The analysis of the effects of industry shifts and within-industry changes, while not providing direct evidence, conforms to arguments that large product demand shifts changed employment patterns and returns to skill in the 1980s, favoring more educated workers. The data were examined for patterns supporting outsourcing and skill-biased technological change as explanations. During the 1980s, manufacturing employment shifted within the United States to lower-wage regions. The shifts were not concentrated among the least educated, however, as a simple version of outsourcing might predict (assuming production workers are generally less educated than non-production workers). Thus, with the exception of the East North Central region, the changes in returns to skill in the regional manufacturing sectors do not support outsourcing between regions as a major factor behind the changes in wage structures. Outsourcing to low-wage foreign nations remains a possible cause of these changes, however. The move towards more educated manufacturing work forces in all regions is consistent with what might be expected if outsourcing to low-wage foreign nations and skill-biased technological change were taking place. The rising returns to skill in manufacturing witnessed in almost all regions (New England being the sole exception) provide indirect support for these hypotheses.

Table 7
Results of Regressing the Change in the College/High School Relative Wage on the Changes in the Inverse of the Unemployment Rates of the Two Groups
Dependent Variable = the percentage point change in college/high school relative wage (from Table 1).

Constant	.17
	(13.9)
X1	.54
	(2.3)
X2	−5.81
	(−4.1)
$\bar{R}^2$	.65

where X1 = 1/CUR88–1/CUR79, where CUR is the unemployment rate for college graduates (Table 6).

X2 = 1/HUR88–1/HUR79, where HUR is the unemployment rate for high school graduates (Table 6).

Figures in parentheses are t-statistics.
Number of observations = 9.

The study also finds that changes in relative supplies of labor were generally not behind the rising returns to skill. Changes in the regional labor forces indicate increasing relative supplies of more educated workers. Thus, changes in relative wages cannot be attributed primarily to changes in labor supplies as Freeman (1977, 1978) and Welch (1979) concluded with respect to the wage changes of the 1970s. Relative supply changes may nevertheless have made some contribution, particularly in the case of young males, among whom the growth in the relative supply of college graduates slowed.

Analysis of unemployment rates in the nine regions suggests that the influence of relative supply shifts was offset by shifts in relative demand. The changes in relative supplies were linked to demand shifts through a Phillips curve type of relationship. Lower unemployment rates among college graduates

were associated with greater increases in the college wage premium, as were higher unemployment rates among high school graduates. In New England, a vigorous economy and an exceptionally strong demand for less educated workers relative to supply seems to account for the unusually small increase in the college premium in that region.

Documenting the changes in the wage structures at a regional level raised more questions than it answered. No single explanation seems to cover the bulk of the changes in wage structures during the 1980s. This is in stark contrast to the experience of the 1970s. Thus, while this study has documented the regional experiences of the 1980s and pointed to some promising explanations, it leaves a wide research agenda open for the future.

Appendix: The Data and Methodology

I. Model I—Returns to Education and Experience

The data used for this study were taken from the March 1980 and 1989 *Current Population Surveys* (CPS), which included income and employment data for 1979 and 1988, respectively. Individual CPS observations included in this analysis were restricted to civilian men, aged 18 to 65, employed in 1979 and 1988. Individuals reporting more than one employer during the year or individuals identifying themselves as self-employed or having worked without pay were excluded.

Based on the actual years of schooling completed, each individual was categorized as a dropout (less than 12 years of education), a high school graduate (12 years), an individual with some college education (13 to 15 years), or a college graduate (16 or more years of schooling).

Potential experience was proxied by a function used by Mincer (1974) and now conventional in the literature:

$$\min (\text{Age} - \text{Years of Schooling} - 6, \text{Age} - 18).$$

Observations were then classified by potential experience of 1 to 10, 11 to 20, 21 to 30, 31 to 40, and 41 or more years. With four education classes and five potential experience classes, each observation thus fell into one of 20 education/experience cells.

Hourly wages were proxied using data on annual income, weeks employed, and hours worked per week as reported from the supplementary questionnaires of the March surveys. Wages were converted to real terms by deflating incomes using the Personal Consumption Expenditure Implicit Price Deflator.

One problem confronting the user of CPS income data arises from the top-coding of respondents' incomes, which truncates the true distribution. In the March 1980 CPS, for example, salary and wages earned in 1979 were top-coded at a maximum of $50,000. The 1989 survey top-coded salary and wages at $99,999. Following Kosters (1989), this problem was addressed by fitting a Pareto distribution to the observations in each of the 20 education/experience cells. Using a method of maximum likelihood estimation, an estimate of the mean of the true incomes of those individuals reporting the maximum top-coded incomes was thus obtained within each cell.

The data were analyzed using hedonic log-wage multivariate regressions of the following basic form:

$$\ln W = \alpha_o + \sum_{j=1}^{3} \beta_j E_j + \sum_{k=1}^{4} \gamma_k X_k + \sum_{m} \delta_m Z_m + \xi$$

where w is the real hourly wage; E_j is a dummy variable representing high school graduates, some college, and college graduates; X_k is a dummy variable for each potential experience class; Z_m is one of a list of demographic variables affecting wages, as described below; and ξ is an error term.

The hedonic log-wage regression equations have the desirable property that the resulting coefficients provide estimates of the "characteristic returns" to the various labor groups. The coefficient for college graduates (β_3), for example, can be interpreted as the average labor market return to sixteen or more years of education, other things equal. It is thus an estimate of the log wage differential received by a college graduate above the basic rates paid to dropouts.

Variables identifying race or ethnic group (black and Hispanic) were included to control for the possible discrimination effects. Marital status was also controlled for by a dummy variable. A dummy variable was also included identifying residence outside a Standard Metropolitan Statistical Area (SMSA), acknowledging the historically lower wages paid outside SMSAs. Lastly, variables identifying full-time workers having worked less than a full year and part-time workers employed either for a full year or a portion thereof were included to distinguish the desirability of different employment terms. The above constitutes the basic model or Model I.

Because of the large number of variables, only the coefficients for the human capital variables are presented in the appendix tables. These coefficients estimate the returns to each education (or experience) class relative to the earnings of a male with less than a high school education (and 10 or less years of experience). For example, in Table A1 the coefficient for a high school education in 1979 shows male U.S. high school graduates earned a "wage premium" of .219 log points or nearly 25 percent more than a male with less than twelve years of education; college graduates tended to earn .500 log points (65 percent) more than males with less than twelve years of education.

Table A1

Returns to Years of Education and Potential Experience for Male Workers, 1979 and 1988

Estimated Coefficients from Model I

Region	Years of Education[a]			Years of Potential Experience[b]			
	12	13–15	16+	11–20	21–30	31–40	41+
1979							
United States	.219	.289	.500	.247	.320	.322	.236
New England	.207	.319	.558	.264	.345	.382	.310
Middle Atlantic	.189	.271	.561	.286	.384	.402	.281
East North Central	.152	.199	.409	.293	.349	.375	.262
West North Central	.204	.281	.432	.231	.315	.308	.166
South Atlantic	.230	.346	.572	.245	.309	.327	.255
East South Central	.267	.291	.458	.230	.323	.280	.191
West South Central	.217	.281	.526	.255	.301	.242	.199
Mountain	.205	.210	.426	.185	.286	.237	.235
Pacific	.226	.289	.441	.216	.289	.299	.212
1988							
United States	.213	.339	.637	.275	.397	.407	.401
New England	.178	.291	.587	.215	.305	.319	.260
Middle Atlantic	.185	.378	.653	.258	.391	.401	.358
East North Central	.190	.325	.567	.246	.429	.442	.441
West North Central	.182	.318	.559	.270	.382	.374	.359
South Atlantic	.196	.344	.678	.296	.370	.404	.465
East South Central	.207	.333	.622	.227	.449	.399	.280
West South Central	.259	.331	.687	.304	.382	.420	.448
Mountain	.233	.300	.601	.273	.393	.409	.422
Pacific	.235	.355	.630	.322	.432	.390	.346

Note: Standard errors are suppressed for the sake of brevity. A t-test on the null hypothesis that a given estimated coefficient is not significantly different from zero allowed rejection of the null for each and every human capital variable at a 99 percent confidence level in every regional cross-section as well as the United States. An f-test performed on each cross-section rejected the null hypothesis that the human capital and demographic variables are jointly insignificant in explaining the variation in the dependent variable, also at a 99 percent confidence level. Finally, an f-test performed for each sample year rejected the null hypothesis in each case that the regional coefficients are not significantly different from those estimated for the entire U.S. sample, again at a 99 percent confidence level.

[a]Education groups for this study are: less than 12 years of education (dropouts); 12 years (high school graduates); 13 to 15 years (some college); 16 or more years (college graduates).

[b]Potential experience groups are: 1 to 10 years of potential experience; 11 to 20; 21 to 30; 31 to 40; 41 or more.

Source: U.S. Bureau of the Census, *Current Population Survey*, 1980 and 1989; author's calculations.

Dummy variables identifying industry of employment and occupation group were added to the basic model to arrive at Model III. The inclusion of industry affiliation variables is justified on three grounds. First, industry variables in hedonic log-wage regressions proxy workplace characteristics that may enter the decision-making process of a worker seeking employment. Work in a hazardous industry such as mining is less desirable, all else equal, than less hazardous employment. A potential worker must therefore be compensated with a risk premium. Second, the industry dummies control for the employment shifts between industries, which have an impact on the wage structure since average wages vary between industries. A final justification for the inclusion of industry variables is provided by the efficiency wage literature. Variables identifying industry affiliation may control for "rents," which vary among industries and which may be paid to workers in the form of efficiency wage premiums. Occupational groups were also distinguished by dummy variables to account for job characteristics necessitating differential compensation and for job-specific capital not captured by education and potential experience proxies. These variables also control for shifts in occupational patterns.

II. Model II—Industry Shift Effects

The cross-sectional data for 1979 and 1988 were pooled. A dummy variable t was constructed where t equaled one for 1988 observations, zero otherwise. The basic hedonic log-wage equation, Model I, was modified to include industry affiliation variables, along with the human capital variables, with the following form:

$$\ln w = \alpha_o + \sum_{j=1}^{3} \beta_j E_j + \sum_{j=1}^{3} B_j E_j t + \sum_{k=1}^{4} \gamma_k X_k$$

$$+ \sum_{k=1}^{4} Y_k X_k t + \sum_{i} \phi_i I_i + \sum_{m} \delta_m Z_m + \sum_{m} D_m Z_m t + \xi$$

This equation yields distinct estimates of the characteristic returns to education and experience for 1979 ($\hat{\beta}_j$, $\hat{\gamma}_k$) and 1988 ($\hat{B}_j$, $\hat{Y}_k$) while estimating constant average industry wage effects ($\hat{\phi}_i$) for both years.

Table A2

Returns to Years of Education and Potential Experience for Male Workers, 1979 and 1988

Estimated Coefficients from Model III

Region	Years of Education[a]			Years of Potential Experience[b]			
	12	13–15	16+	11–20	21–30	31–40	41+
1979							
United States	.161	.215	.389	.214	.276	.272	.210
New England	.137	.195	.393	.234	.282	.330	.242
Middle Atlantic	.120	.164	.340	.248	.338	.332	.242
East North Central	.133	.182	.379	.251	.314	.321	.242
West North Central	.134	.196	.365	.204	.270	.273	.184
South Atlantic	.165	.239	.389	.190	.240	.250	.205
East South Central	.208	.217	.401	.195	.276	.255	.166
West South Central	.129	.186	.394	.223	.268	.215	.190
Mountain	.120	.122	.350	.172	.266	.215	.215
Pacific	.149	.198	.305	.199	.244	.245	.191
1988							
United States	.146	.215	.441	.237	.334	.335	.343
New England	.119	.151	.355	.176	.264	.290	.220
Middle Atlantic	.138	.269	.492	.225	.346	.338	.324
East North Central	.146	.231	.420	.214	.356	.358	.341
West North Central	.123	.201	.367	.201	.293	.277	.313
South Atlantic	.127	.202	.463	.211	.326	.294	.319
East South Central	.131	.202	.407	.166	.372	.312	.214
West South Central	.185	.211	.499	.265	.305	.348	.374
Mountain	.134	.176	.399	.230	.320	.353	.379
Pacific	.119	.186	.370	.286	.370	.317	.297

Notes and Source: See Table A1.

Table A3

Returns to Years of Education and Potential Experience for Males Employed in Manufacturing, 1979 and 1988

Estimated Coefficients using Model I Approach

Region	Years of Education[a]			Years of Potential Experience[b]			
	12	13–15	16+	11–20	21–30	31–40	41+
1979							
United States	.227	.296	.591	.218	.303	.328	.269
New England	.231	.361	.756	.229	.332	.364	.300
Middle Atlantic	.188	.285	.650	.256	.381	.397	.306
East North Central	.196	.262	.512	.245	.318	.331	.314
West North Central	.160	.211	.493	.214	.267	.345	.257
South Atlantic	.276	.346	.764	.251	.355	.383	.305
East South Central	.245	.313	.531	.192	.296	.245	.273
West South Central	.137	.236	.498	.165	.159	.171	.069
Mountain	.157	.150	.390	.130	.274	.278	.206
Pacific	.252	.292	.480	.205	.298	.331	.291
1988							
United States	.195	.370	.716	.267	.414	.436	.498
New England	.160	.373	.661	.255	.335	.338	.280
Middle Atlantic	.171	.315	.703	.235	.380	.361	.410
East North Central	.156	.306	.642	.264	.474	.511	.531
West North Central	.150	.224	.606	.196	.393	.356	.413
South Atlantic	.210	.434	.823	.286	.346	.372	.540
East South Central	.235	.424	.869	.255	.424	.519	.612
West South Central	.316	.519	.828	.260	.455	.466	.553
Mountain	.146	.221	.629	.359	.574	.589	.739
Pacific	.240	.399	.612	.264	.349	.435	.625

Notes and Source: See Table A1.

Table A4

Returns to Years of Education among Young Males (Males with 1 to 10 Years of Potential Experience), 1979 and 1988

Estimated Coefficients from Model III

Region	Years of Education[a] 12	13–15	16+
1979			
United States	.153	.223	.384
New England	.117	.131	.325
Middle Atlantic	.148	.211	.323
East North Central	.177	.210	.359
West North Central	.026	.106	.249
South Atlantic	.117	.239	.438
East South Central	.165	.246	.358
West South Central	.095	.202	.284
Mountain	.133	.131	.355
Pacific	.123	.194	.310
1988			
United States	.151	.237	.470
New England	.113	.200	.326
Middle Atlantic	.201	.401	.537
East North Central	.072	.175	.426
West North Central	.069	.190	.297
South Atlantic	.152	.185	.489
East South Central	.122	.220	.331
West South Central	.216	.256	.551
Mountain	.181	.258	.553
Pacific	.136	.236	.484

Notes and Source: See Table A1.

[1] A partial list of the recent work in this area would include: Blackburn, Bloom and Freeman (1989 a,b); Bound and Johnson (1989 a,b); Katz and Revenga (1989); Kosters (1989); and Murphy and Welch (1988, 1989).

[2] Welch (1979) corroborated Freeman's work, carefully relating the declines in the returns to education and in the wages of young males to the expansion of the relative supply of young educated males.

[3] Concern over "good jobs" versus "bad jobs" was expressed early on by Bluestone and Harrison (1982). A useful survey of the debate may be found in Loveman and Tilly (1988). Questions regarding a proximate issue, "the vanishing middle class," were first raised by Kuttner (1985), and have since been addressed by Bradbury (1986, 1990) and Levy (1987, 1989), among others.

[4] The need to limit the scope of this study required excluding females. While the wage structure for females also evinced rising returns to skill in the 1980s, the differences between females' and males' experiences demand separate studies.

[5] The nine U.S. census regions are New England (CT, MA, ME, NH, RI, VT), the Middle Atlantic (NJ, NY, PA), the East North Central (IL, IN, MI, OH, WI), the West North Central (IA, KS, MN, MO, ND, NE, SD), the South Atlantic (DC, DE, FL, GA, MD, NC, SC, VA, WV), the East South Central (AL, KY, MS, TN), the West South Central (AR, LA, OK, TX), the Mountain (AZ, CO, ID, MT, NM, NV, UT, WY), and the Pacific (AK, CA, HI, OR, WA).

[6] For the nation as a whole, 1979 and 1988 represent roughly comparable points in the business cycle. Unemployment rates in these years were similar. Thus, the rise in returns to skill at the national level does not simply reflect a phase of the business cycle. However, unemployment rates in some of the regions changed substantially over the period. Moreover, unemployment rates differ considerably from one region to another. Thus, some of the observed changes in the returns to skill at the regional level and some of the variations among regions may reflect changes and variations in general labor market conditions.

[7] As the estimated wages have been calculated in log form, the ratio of real hourly wages of any two skill groups is obtained simply by exponentiating the difference of the respective groups' estimated log wages.

[8] Using different methodologies other authors have found roughly equivalent increases. Blackburn, Bloom, and Freeman (1989b), for example, find that the college/dropout relative wage increased from 1.584 in 1979 to 1.878 in 1988 among males aged 25 to 64. Bound and Johnson (1989a) find that the college/high school relative wage increased from 1.30 to 1.57 among males with five years of potential experience. Katz and Revenga (1989) find that the college/high school relative wage increased 14 percent among males between the ages of 18 and 65.

[9] The returns to skill gathered through experience also increased among males between 1979 and 1988. In the nation and eight of the nine regions, the experience-earnings profile of males steepened, as wage gains were proportionately greater among the most experienced. New England was an exception to the trend; the returns to all the more experienced cohorts fell relative to those of the least experienced.

[10] Bound and Johnson (1989a,b) provide more exhaustive summaries of the possible explanations for the rising returns to skill. They also give examples of possible methods for testing the various hypotheses directly and the difficulties associated with each test.

[11] Murphy and Welch (1988) compile evidence corroborating this line of argument, though it has not gone unchallenged. Bound and Johnson (1989a), for example, find that product demand shifts cannot explain the bulk of the relative wage changes witnessed in the 1980s.

[12] It should be recognized that Models I and II are not strictly comparable. In particular, the intercept terms differ between 1979 and 1988 in Model I, but Model II implies a common intercept.

[13] These results are generally consistent with those of other studies: specifically, Blackburn, Bloom, and Freeman (1989b) found industry shift effects accounted for 23 to 30 percent of the change in earnings differentials among males between the ages of 25 to 64, and 17 to 24 percent of the changes among males 25 to 34 years of age.

[14] These observations are based upon the changes within each region in the distribution of employment of males meeting the specifications discussed in the Appendix. The resulting distribution does not coincide with the distribution of employment of all males in the nation and in each region.

[15] Freeman and Katz (1988) explore the issue of employment and wage response to changes in product demand and find empirical evidence for a trade-off between the two. Surprisingly, they find that wage response is greater in unionized than in non-unionized industries.

[16] The term outsourcing is also used to describe a firm's contracting out of activities rather than performing them internally. Much of this contracting out should be picked up in the industry and occupational variables. For example, the effect of manufacturers contracting with janitorial services to clean their buildings should be picked up in the shift from manufacturing to services.

[17] This evidence also raises a point of contrast to product demand shifts as an explanation. If an industry suffers adverse product demand shifts, the skill group most concentrated in that sector will suffer the greatest employment losses in absolute number if all skill groups incur a certain percentage cut in employment. The burden, however, lies on the product demand shift hypothesis to explain why some skill groups should suffer a greater percentage loss of their shares of employment in response to the shift.

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