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Chapter Title: A Comparison of Changes in the Structure of Wages in Four OECD Countries

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1   A Comparison of Changes in the Structure of Wages in Four OECD Countries

Lawrence F. Katz, Gary W. Loveman, and
David G. Blanchflower

In the 1970s, the relative earnings advantage of highly educated workers, particularly recent or young university graduates, deteriorated in the United States and most other OECD nations (Freeman 1981). This decline coincided with a pattern of decreasing wage differentials by occupation throughout much of the developed world. The narrowing of skill differentials in the 1970s appears to have been strongly related to dramatic increases in the relative supply of highly educated workers generated by the labor force entrance of baby-boom cohorts and the rapid expansion of higher education. Explicit government and trade union policies aimed at reducing earnings differentials are also likely to have been an important factor in many countries.

In contrast to the experience of the 1970s, wage differentials by education and occupation expanded dramatically in the United States in the 1980s. Over the past ten years, the U.S. wage structure also changed substantially along several other dimensions: wage differentials by experience rose for less educated workers, earnings inequality within education-experience-gender groups increased, and gender differentials narrowed. These changes generated a large increase in overall wage inequality among both men and women and led to a

particularly sharp deterioration in the relative earnings of young, less educated men.

Many explanations have been offered for recent U.S. wage structure developments. One class of explanations argues that rising education differentials and narrowing gender differentials reflect shifts in the relative demand for labor favoring "more skilled" over "less skilled" workers and possibly women over men. Candidates for shifts in demand favoring more skilled workers include technological changes associated with the spread of computers and computer-based technology that reduce the demand for physical labor and increase the demand for workers able to learn at least cost (Berman, Bound, and Griliches 1994; Krueger 1993; and Mincer 1991); the loss of manufacturing jobs offering relatively high pay to less educated workers; and the transfer of jobs requiring relatively routinized tasks to low-wage countries (Reich 1991). Other explanations focus on changes in wage-setting institutions such as the declining influence of unions (Freeman 1993), the erosion of the real value of the minimum wage (DiNardo, Fortin, and Lemieux 1994), and changes in pay-setting norms (Mitchell 1989).

Much research attempting to evaluate these alternative explanations for changes in the U.S. wage structure in the 1980s (e.g., Bound and Johnson 1992; Juhn, Murphy, and Pierce 1993; and Katz and Murphy 1992) has attempted to exploit U.S. time-series information by essentially comparing the experience of the 1980s with the experiences of the 1970s and the 1960s. Katz and Murphy (1992) conclude that any consistent explanation of U.S. wage structure changes since the late 1960s requires a rapid secular growth in the demand for "more skilled" workers.

U.S. time-series information alone is probably insufficient to distinguish sharply among competing explanations for recent wage structure changes. A complementary approach is to collect comparable time-series data for several countries on wage structure changes and on measures of changes in the supply of and demand for different labor inputs. Changes in wage structures across countries not accounted for by demand and supply shifts constitute a residual category that may be the result of a variety of factors. In particular, an examination of labor market institutions may play an important role in understanding differences in the evolution of relative wages across countries.[1]

In this paper, we assemble roughly comparable time series of data on changes in the structure of wages in the United States, Britain, Japan, and France. These four countries provide useful contrasts since they include two countries with decentralized wage-setting institutions (the United States and Britain), one representative of the relatively centralized wage-setting systems characteristic of continental Europe (France), and a high-growth economy

1. Recent studies exploiting broad cross-country comparisons to examine alternative hypotheses for changing wage structures include Davis (1992), Gottschalk and Joyce (1992), and OECD (1993).

with strong trade performance (Japan). We examine supply and demand and institutional explanations for the differences in wage structure changes among these countries.

Our major findings concerning similarities and differences among these four countries in patterns of changes in relative wages can be summarized as follows:

1. Trends in overall wage inequality by sex. All four countries share a pattern of rising wage inequality among both men and women in the 1980s, but the magnitudes of the increases differ substantially. Great Britain and the United States both displayed dramatic increases in wage inequality during the 1980s, while the increase in Japan was much more moderate. France experienced declining inequality until 1984 and a moderate increase from 1984 to 1990.

2. Changes in education/occupation differentials. Educational and nonmanual/manual wage differentials narrowed in all four countries in the 1970s. The college wage premium and nonmanual/manual differentials expanded dramatically in the United States and Britain in the 1980s and moderately in Japan. Occupational differentials continued to narrow in France in the 1980s, with a hint of a slight upturn for males after 1985.

3. Within-group inequality. Wage inequality among those with similar education and experience increased for both men and women in the United States and Britain in the 1980s.

We find that simple supply and demand measures go a reasonable distance toward explaining the differences and similarities among these countries in patterns of relative wage movements. Relative labor demand appears to have been rapidly shifting in favor of more educated workers in OECD countries throughout the past twenty years. But the relative supply of college-educated workers grew rapidly enough to drive down skill differentials in all four of our countries during the 1970s. The pace of growth of the relative supply of highly educated workers decelerated substantially in the 1980s in the United States, Britain, and Japan, and each of these experienced rising college wage premiums in the 1980s. An acceleration in the pace of industrial shifts in employment away from sectors that disproportionately employ male manual workers also appears to be an important part of the reason for the tremendous increase in skill differentials in Britain in the 1980s.

Institutional differences across the countries translated the relative demand shifts against less educated workers into similar outcomes of sharply rising inequality in the United States and Britain in the 1980s but a very different outcome in France through the mid-1980s. In France, a high and pervasive minimum wage and contract extensions prevented the relative wages of the unskilled from falling significantly, despite substantial employment declines.

The French experience appears to be consistent with the evidence from other continental European countries, such as Germany and Italy, where significant relative demand shifts did not result in large increases in wage differentials through the late 1980s (Abraham and Houseman, chap. 11 in this volume; Erickson and Ichino, chap. 8 in this volume). Finally, the strength of the Japanese manufacturing sector may partially account for the much smaller magnitude of changes in skill differentials in Japan than in Britain and the United States during the 1980s.

The remainder of the paper is organized as follows. Section 1.1 contrasts changes in overall wage inequality in these four countries over the last twenty-five years. Section 1.2 presents more detailed evidence on changes in the structure of wages in the four countries. Section 1.3 provides supply and demand measures for each country and examines their contribution to changes in the wage structures of the four countries. Section 1.4 provides a speculative discussion of the role played by labor market institutions in explaining the movements in wage differentials not accounted for by demand and supply effects. Section 1.5 concludes.

1.1   Changes in Overall Wage Inequality

We begin by contrasting overall movements in wage inequality in France, Japan, the United Kingdom, and the United States.[2] Figure 1.1 summarizes movements in wage inequality by sex for full-time workers.[3] The figure plots the time series of overall wage inequality for each group as measured by the log wage differential between the ninetieth and the tenth percentiles of the wage distribution for that group. The figure shows large increases in wage inequality in the 1980s in the United States and Britain, a moderate increase in Japan, and a small increase in France starting in 1984. Panel A of figure 1.1 indicates that the 90–10 log wage differential for U.S. males increased substantially in the 1970s (from 1.15 in 1969 to 1.30 in 1979) and even more rapidly in the 1980s (increasing by 0.19 from 1979 to 1989). Wage inequality for U.S. females remained stable in the 1970s and then expanded dramatically in the

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2. A summary of aggregate labor market developments from 1965 to 1989 in the four countries is presented in appendix table 1A.1.

3. Detailed information on the sources, earnings concepts, and sample selection criteria of all the data sets used to measure wage structure changes in this paper is presented in the data appendix. The wage inequality measures in fig. 1.1 refer to the following earnings concepts and samples: (1) United States: hourly wages (annual earnings divided by the product of weeks worked and usual weekly hours) for full-time workers, eighteen to sixty-four years old, using data from the Annual Demographic Supplements to the March Current Populations Surveys (CPSs); (2) Britain: gross hourly earnings for full-time workers from the New Earnings Survey (NES); (3) France: gross annual earnings adjusted for hours differences for full-time, full-year workers from the Declarations Annuelles de Salaires (DAS); and (4) Japan: monthly scheduled earnings for regular workers from the Basic Survey on Wage Structure.
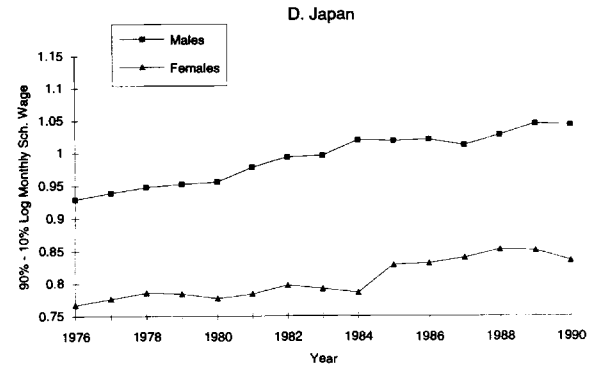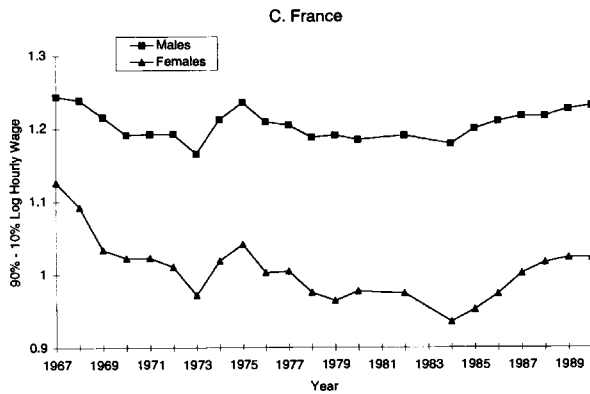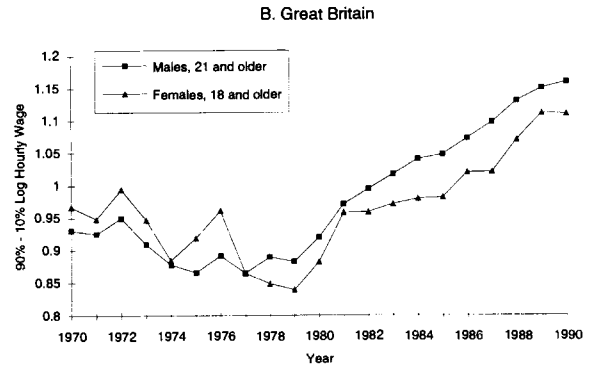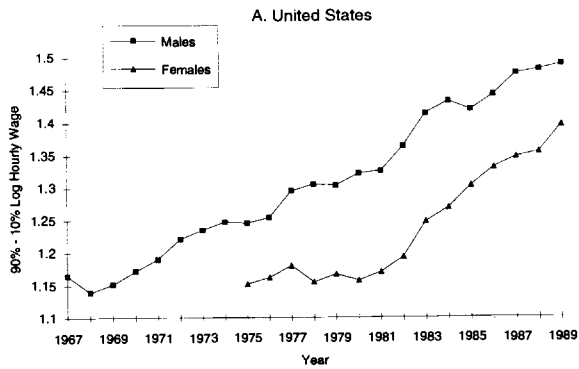
Fig. 1.1   Changes in overall wage inequality by sex

1980s.[4] The figure illustrates a strong similarity in the pattern of sharply rising inequality in the United Kingdom and the United States in the 1980s. In contrast to the U.S. experience, earnings inequality actually narrowed substantially in Britain in the 1970s. Panel C shows that the 90–10 log wage differentials for both men and women narrowed in France from 1967 to 1984 and then show a moderate increase from 1984 to 1990. Finally, panel D indicates a gradual increase in the 90–10 log wage differential of 0.11 for men and of 0.07 for women from 1976 to 1990 in Japan.

France is the only one of the countries that shows no evidence of rising wage inequality in the early 1980s. France's delayed and muted changes in wage structure may reflect labor market institutions that make it difficult to expand skill differentials. A system of minimum wages and contract extensions in France means that unions can have a large effect on wages even with low union density. Smaller increases in wage inequality in Japan than in the United States and Britain may reflect the stability of Japan's manufacturing employment share during the 1980s.

How did the changes in relative earnings documented in figure 1.1 translate into changes in real earnings? Figure 1.2 tries to answer this question by plotting the cumulative log real wage growth of the tenth, fiftieth, and ninetieth percentiles of the wage distributions for men in each country. More precisely, the figure displays the log ratio of each group's real earnings in each year relative to that group's level of real earnings in 1979 (the base year). Panels A and B show fairly similar increases in the 90–10 differential in the 1980s in Britain and the United States but indicate that these increases implied a 0.12 decline in real log earnings from 1979 to 1989 at the tenth percentile in the U.S. wage distribution and a 0.12 increase in real log earnings at the same point of the British distribution. The figure indicates that only in the United States was rising wage inequality in the 1980s accompanied by declining real wages for low-wage males. Even the median U.S. male employee experienced a modest decline in real hourly earnings from 1979 to 1989. Real earnings growth was rapid throughout the earnings distribution in France in the 1960s and 1970s and much more gradual in the 1980s. Panel D shows that real wages have grown rapidly for all groups in Japan over the last fifteen years.

In summary, earnings inequality has increased greatly over the last twenty years in Britain and the United States and fairly moderately in Japan. Over the same period, wage inequality has not changed much in France.

4. We do not present estimates of the 90–10 differential for women prior to 1975 because of changes in the CPS between the March 1975 and 1976 surveys. We use imputation procedures for weeks and hours worked for the survey years prior to 1976 developed by Kevin M. Murphy that have been calibrated to fit hours- and weeks-worked distributions for men and not for women. Thus, we are skeptical of hourly earnings distribution estimates for women prior to 1975.

A. United States, 18-65 Years Old

Log Real Hourly Wage vs Year (1963–1989)

Legend:
- 90th Percentile
- 50th Percentile
- 10th Percentile

B. Great Britain, 21 Years Old and Older

Log Real Hourly Wage vs Year (1970–1990)

Legend:
- 90th Percentile
- 50th Percentile
- 10th Percentile

C. France, All

Log Real Hourly Wage vs Year (1967–1987)

Legend:
- 90th Percentile
- 50th Percentile
- 10th Percentile

D. Japan, All

Log Real Monthly Scheduled Earnings vs Year (1976–1990)

Legend:
- 90th Percentile
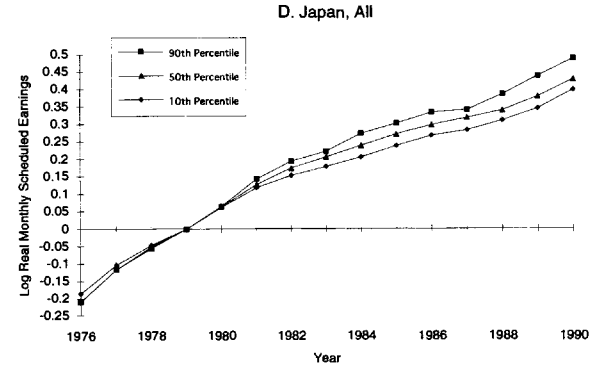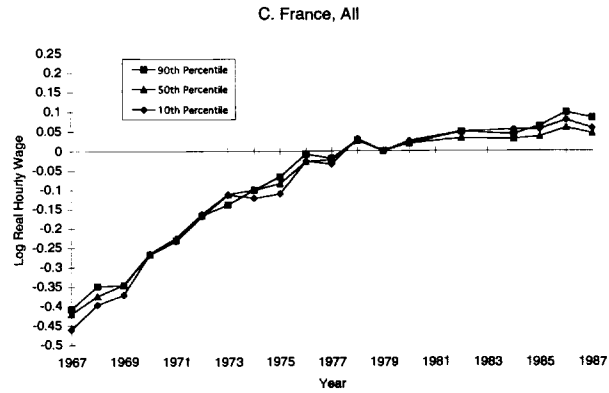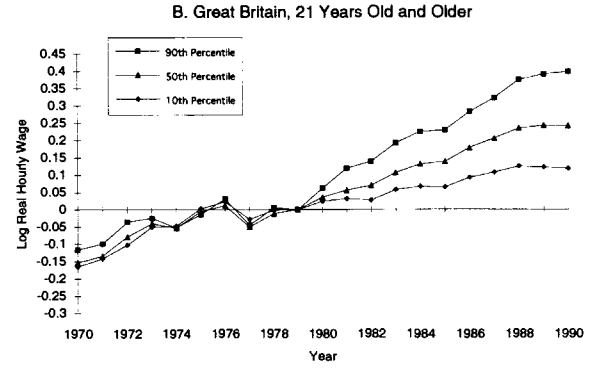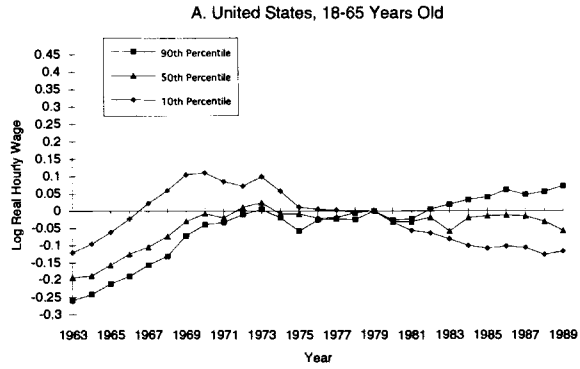- 50th Percentile
- 10th Percentile

Fig. 1.2 Cumulative real wage growth by decile, males

1.2   Wage Structure Changes in Four Countries

In this section, we turn to a more detailed examination of the patterns of relative wage changes that underlie trends in overall wage inequality in the United States, Britain, Japan, and France. We first separately examine the four countries using the best data available to illustrate each country's wage structure changes. We then summarize the major differences and similarities in patterns of relative wage changes across countries.

1.2.1   Changes in the Structure of Wages in the United States

We examine U.S. wage structure changes over the period 1967–91.[5] Figure 1.3 summarizes relative wage changes for the period 1967–89 using data from all twenty-three Annual Demographic Supplements to the March Current Population Survey (CPS) for survey years 1968–90. The wage measure is hourly earnings computed as annual earnings divided by annual hours (annual weeks worked times usual weekly hours). Table 1.1 provides information on real earnings levels and changes in real and relative earnings by sex-education-experience groups for the period 1979–91 using data from all twelve months of the CPS outgoing rotation groups (ORGs) for 1979, 1987, and 1991. The wage concept used in table 1.1 is the hourly wage measured as usual weekly earnings divided by usual weekly hours. The wage samples used in the figure and the table consist of full-time workers (defined as those who usually work thirty-five or more hours per week).

Panel A of figure 1.3 documents movements in the college/high school log wage ratio for all males (those with one to forty years of potential experience) and for new entrants (those with one to five years of potential experience). The time series of college returns for all males is the fixed-weighted average of the college/high school log wage ratios for workers in forty experience groups (with each group covering a single-year experience interval). The returns for new entrants are a fixed-weighted average of the ratios for corresponding five single-year experience groups. (The weights used in all fixed-weighted averages presented for our U.S. data from the March CPSs are the average shares of the groups in total weeks worked over the entire period 1967–89.) We use fixed-weighted averages to control for changes in the age composition of the different education groups. The figure illustrates that the college wage premium is stable from 1967 to 1971, fell from 1971 to 1979, then rose sharply from 1979 to 1986, and remained at an extremely high level at the end of the 1980s. The swings in education differentials were much larger for new entrants than for older workers in the 1970s and 1980s.

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5. For a survey of the burgeoning literature examining recent changes in the U.S. wage structure, see Levy and Murnane (1992).

Table 1.1   **Summary of Changes in the U.S. Wage Structure, 1979–91**

Sex	Experience (years)	Education (years)	Estimated Mean Log Hourly Earnings			
			1979	1987	1991	Change, 1979–91
Male	5	10	2.168	1.946	1.874	−.294
		12	2.361	2.155	2.087	−.274
		14	2.440	2.299	2.235	−.205
		16	2.602	2.588	2.536	−.066
	25	10	2.537	2.396	2.304	−.233
		12	2.693	2.612	2.533	−.160
		14	2.811	2.792	2.725	−.086
		16	3.016	2.985	2.937	−.079
Female	5	10	1.909	1.737	1.709	−.200
		12	2.075	1.976	1.930	−.146
		14	2.218	2.170	2.126	−.092
		16	2.377	2.444	2.426	.049
	25	10	2.051	1.964	1.938	−.113
		12	2.197	2.219	2.191	−.006
		14	2.331	2.437	2.422	.092
		16	2.486	2.564	2.583	.097

Note: Each estimate is from a separate cross-sectional regression for full-time workers by sex and year of log real hourly earnings on ten schooling dummies (for fewer than eight, nine, ten, eleven, thirteen, fourteen, fifteen, sixteen, seventeen, and eighteen or more years of schooling), a quartic in experience, interactions of all the experience terms with three broad education-level dummies (fewer than twelve, thirteen to fifteen, and sixteen or more years of schooling), two race dummies, interactions between the race dummies and the broad education-level dummies, and a metropolitan-area dummy. The estimates are predicted values for white, full-time workers, residing in a metropolitan area evaluated at the indicated education and experience levels. Earnings levels are converted to 1991 dollars using the implicit price deflator for personal consumption expenditures from the U.S. national income accounts. The data are from the CPS outgoing rotation groups (ORGs) for 1979, 1987, and 1991. The sample sizes in the regressions ranged from 45,140 to 69,415 observations.

Sharp increases in education differentials are further illustrated in table 1.1. The table presents estimated mean log real hourly wages for men and women at four education levels and two potential experience levels in 1979, 1987, and 1991.[6] These adjusted means of log hourly earnings allow us to control for changes in observed measures of group composition in making inferences concerning real and relative wage changes. Earnings differentials widened among each successive education category for both young workers (those with five

6. The estimates are predicted values from separate log hourly earnings regressions by sex for full-time workers run in each year using data from the CPS ORG samples.

A. Returns to College for Males, All and New Entrants

Legend:
- All experience levels
- 1-5 years of experience

(x-axis: Year; y-axis: College/High School Log Wage Ratio)

B. Returns to Experience for Males by Education

Legend:
- High School
- College

(x-axis: Year; y-axis: Log Wage Ratio: 26-35 / 1-5 Yrs. of Experience)

C. Gender Differentials by Education

Legend:
- High School
- College

(x-axis: Year; y-axis: Female/Male Log Wage Ratio)

D. Residual Wage Inequality, 90-10 Differential

Legend:
- Males
- Females

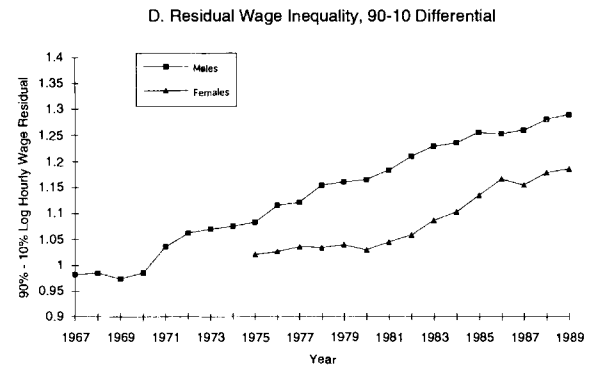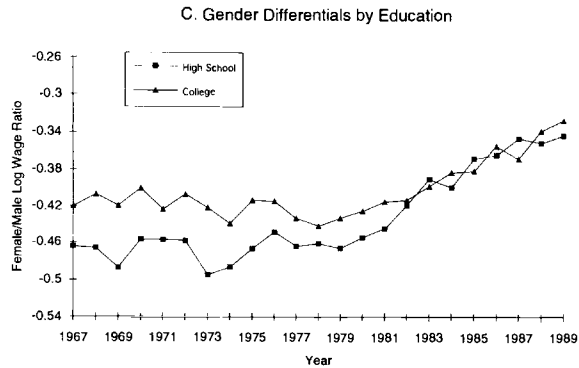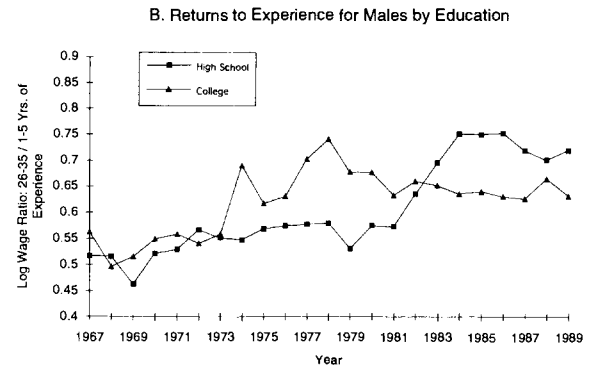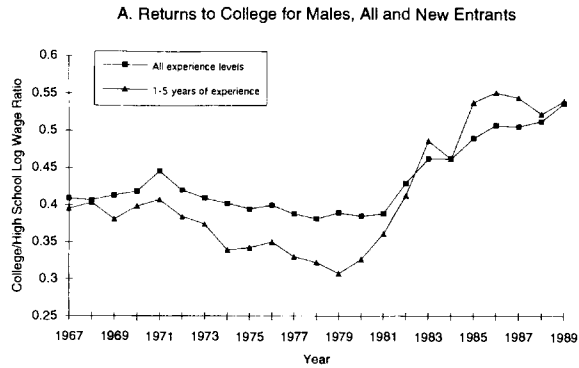(x-axis: Year; y-axis: 90% - 10% Log Hourly Wage Residual)

Fig. 1.3   U.S. relative hourly wage changes, 1967–89

years of experience) and prime-age workers (those with twenty-five years of experience) in the 1980s. These relative wage changes in a period of negative average real wage growth for males generated a decline in the real hourly wages of young, less educated males of 25 percent. The earnings differentials between young college graduates and high school graduates increased by approximately 20 percent for both men and women during the 1980s. The pace of increase in educational wage differentials was much slower in the period 1987–91 than in the period 1979–87.

Panel B of figure 1.3 compares movements in the log ratio of the earnings of peak earners (those with twenty-six to thirty-five years of experience) to new entrants for college and high school males. The figure shows that, while experience differentials expanded for both groups from 1967 to 1989, the time patterns of the changes differ substantially. Experience differentials for college graduates expanded from the early 1970s to 1978 and since then have declined. The gap between wages of peak earners and new entrants for less educated males increased sharply from 1979 to 1987 and exhibits a minor decline at the end of the 1980s. Table 1.1 shows similar patterns extending to 1991. The 1980s increase in experience differentials for males with twelve or fewer years of schooling occurred in a period in which the relative supply of less educated new entrants was actually decreasing. The sharp decline in the earnings of less educated young males relative to both college-educated workers and less educated, older workers suggests a sharp shift in demand against less skilled workers, with the bulk of the adjustment falling on younger workers, and older, less educated workers somewhat insulated from external labor market developments by specific human capital and internal labor markets with seniority layoff rules.

Panel C presents changes in female/male log wage ratios for high school and college workers.[7] Male/female wage differentials in the United States narrowed substantially during the 1980s. The improvement in relative female earnings in the 1980s was slightly greater among high school than among college workers.

The data so far analyzed in this section refer to changes in real wages for groups distinguished by gender, education, and experience. However, given that these factors account for only about one-third of the differences in wages across workers, there is significant room for relative wage changes within these categories as well. We next examine changes in the dispersion of relative wages within our gender by experience by education categories. Empirically, we do this by looking at the distribution of residuals from separate regressions for men and women in each year of log hourly wages on a set of education-level dummies, a quartic in experience fully interacted with broad education-level dummies, race dummies, and interactions of race dummies with broad education-level dummies.

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7. The plots are of fixed-weighted averages of the female/male log wage ratios for forty single-year experience groups for both college and high school workers.

Panel D of figure 1.3 plots the time series of the difference in the ninetieth and tenth percentiles of the distributions of residuals from these regressions for men and women. The figure shows that within-group (residual) inequality expanded enormously, with the 90–10 differential in log weekly wages expanding by 0.31 for men over the period 1967–89 and by 0.13 for men and 0.15 for women from 1979 to 1989. Residual inequality started to expand in the early 1970s and continued increasing rather smoothly in the 1980s. This time pattern contrasts sharply with the pattern for education differentials. We conclude from these differences in timing that the general rise in within-group inequality and the rise in education premiums over the period 1963–87 are actually somewhat distinct economic phenomena.[8]

1.2.2 Changes in the Structure of Wages in Great Britain

Data that are reasonably consistent over time on wages by age, gender, occupation, and industry for the United Kingdom are available for 1968 and for every year since 1974 from the New Earnings Survey (NES).[9] The NES is a sample survey of the earnings of employees in employment in Great Britain in April of each year. While individual level data from the NES are not publicly available, published tabulations provide detailed cell means and information on within-group earnings distributions for age, gender, occupation, and industry groups. We examine earnings changes for full-time employees whose pay for the survey pay period was not affected by absence and use gross hourly earnings as our basic wage measure.

Figure 1.4 highlights major changes in relative wages in Great Britain from 1968 to 1991. Panel A plots the nonmanual/manual log hourly wage differential for both males and females. The time series differ from the usual manual/nonmanual differentials presented in many British publications in that they are fixed-weighted averages of the differences in the log of the median gross hourly wages of nonmanual and manual workers in five age groups for both males and females.[10] The figure shows that nonmanual/manual differentials for men and women declined greatly from 1968 to 1974, remained fairly stable from 1974 to 1979, and then increased sharply in the 1980s. The fixed-weighted nonmanual/manual differential increased over the period 1979–91 from 0.32 to 0.46 for males and from 0.22 to 0.43 for females.[11]

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8. The finding of rising within-group wage inequality in the United States during the 1970s is fairly robust in the March CPS data, but it is not apparent in all other large national household surveys. For example, Mishel and Bernstein (1994) find that rising within-group wage inequality did not emerge until the beginning of the 1980s (or end of the 1970s) in data on hourly earnings from the May CPS data on hourly wage rates and usual weekly earnings and hours.

9. The NES is described in detail in U.K. Department of Employment (1991).

10. The five age categories used are twenty-one to twenty-four, twenty-five to twenty-nine, thirty to thirty-nine, forty to forty-nine, and fifty to fifty-nine years of age. The fixed weights are the average shares in total employment of each age-sex cell in the years 1974, 1979, 1984, and 1989.

11. For a detailed presentation of changes in wages by occupation for males in Great Britain from 1973 to 1986, see Adams, Maybury, and Smith (1988).

A. Nonmanual/Manual Wage Differentials by Sex

B. Returns to Experience for Males
Fixed Weighted Average of Manual and Nonmanual Differences

C. Gender Differentials, Overall and by Occupation

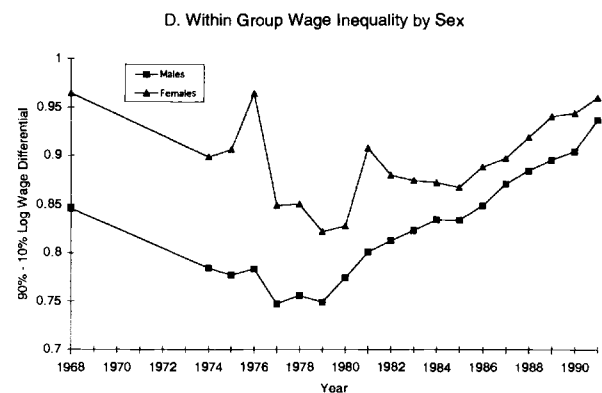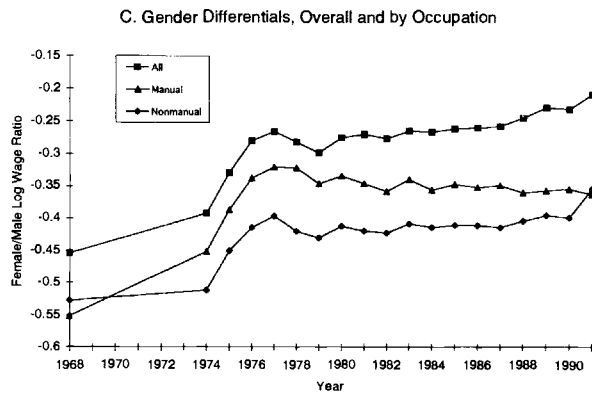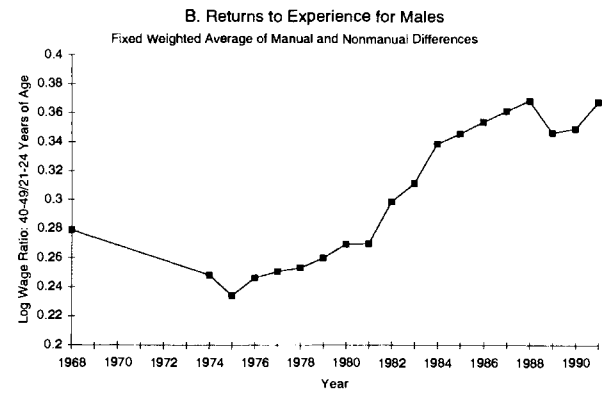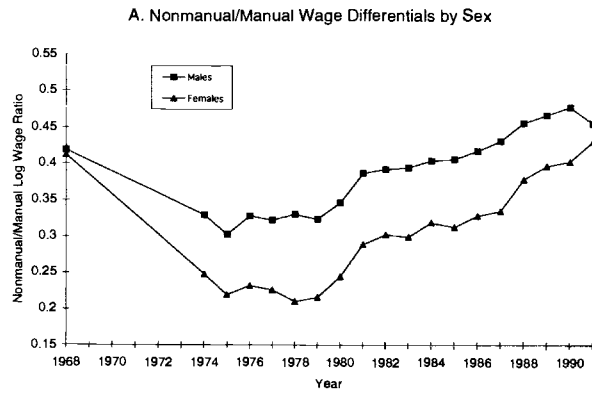D. Within Group Wage Inequality by Sex

Fig. 1.4   U.K. relative hourly wage changes, 1968–91

Panel B of figure 1.4 shows that experience differentials for males expanded moderately in the second half of the 1970s and quite substantially in the first part of the 1980s. Similar increases in experience differentials are apparent for both manual and nonmanual males. Panel C shows that gender differentials remained fairly steady from 1976 to 1987, after narrowing dramatically under the influence of the Equal Pay Act in the early to mid-1970s. Gender differentials have narrowed a bit more since 1987.

Panel D illustrates that wage inequality within sex–age–broad occupation cells narrowed in the 1970s and then expanded greatly in the 1980s. The figure plots for both men and women the fixed-weighted average in each year of the 90–10 log hourly wage differentials of ten age-occupation cells.[12] In fact, wage inequality increased greatly in the 1980s in Great Britain within both detailed occupations and detailed occupation–industry–gender cells (Katz and Loveman 1990).

While the NES does not provide information on the educational attainment of employees, reasonably comparable individual level data on earnings, demographic characteristics, and educational attainment are available from the General Household Surveys (GHSs) since 1974. The GHS is an annual CPS-style survey of ten to fifteen thousand households.[13] Table 1.2 uses the GHS data to examine the earnings of university graduates relative to individuals with no "educational qualifications" over the period 1974–90. All British children must attend full-time education until the age of sixteen, at which time a large portion of them leave school without earning any educational qualifications. We use the earnings differential between those with university degrees and those with no qualifications as a rough measure of the returns to higher education in Britain. Tabulations for individuals aged sixteen to sixty from the 1989 Labour Force Survey (a much larger household survey than the GHS that unfortunately does not have wage data) indicate that 11 percent of employed males and 7 percent of employed females had a university degree of equivalent qualification while 24 percent of employed males and 31 percent of employed females had no qualifications.

The reported university degree differentials in table 1.2 are the estimated coefficients on a university degree dummy variable in separate regressions for men and women of log gross weekly pay before deductions on thirteen highest educational qualifications dummies, ten region dummies, a race dummy, experience, experience squared, and month dummies.[14] The base education group is those with no qualifications. Thus, table 1.2 compares the earnings of those with university degrees to members of this no qualifications group with the

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12. The ten cells for each sex involve the combination of five age groups (twenty-one to twenty-four, twenty-five to twenty-nine, thirty to thirty-nine, forty to forty-nine, and fifty to fifty-nine) and two broad occupation categories (manual and nonmanual).

13. For a detailed discussion of earnings and education data in the GHS, see Schmitt (chap. 5 in this volume).

14. The samples for the regressions include full-time employees from sixteen to sixty-nine years of age. Year dummies are included in all the regressions.

Table 1.2   **Log Weekly Earnings Equations, Great Britain, 1974–90**

	1974–75	1978–79	1982–83	1988–90
Males:				
Degree	.6517	.5848	.6204	.6403
	(.0152)	(.0133)	(.0155)	(.0167)
Experience	.0522	.0533	.0534	.0562
	(.0008)	(.0007)	(.0010)	(.0013)
Experience^2	−.0009	−.0009	−.0009	−.0010
	(.00002)	(.00002)	(.00002)	(.00003)
R^2	.4238	.4143	.3569	.3567
N	12,542	12,424	9,010	8,416
Females:				
Degree	.8344	.7530	.7738	.7947
	(.0356)	(.0283)	(.0277)	(.0261)
Experience	.0293	.0279	.0328	.0341
	(.0014)	(.0014)	(.0016)	(.0018)
Experience^2	−.0005	−.0005	−.0006	−.0006
	(.00003)	(.00003)	(.00003)	(.00004)
R^2	.3470	.3271	.3321	.3271
N	5,497	5,615	4,359	4,876

Source: General Household Surveys, 1974–90.

Note: The dependent variable is log gross weekly pay before deductions. Individuals reported their pay the last time they were paid as well as the period covered by this payment. Earnings were then set on a weekly basis. Equations include eleven month dummies, ten region dummies, year dummies, and thirteen qualifications dummies including degree plus a race dummy. The numbers in parentheses are standard errors. The sample is restricted to full-time employees.

same number of years of labor market experience. Regressions are reported for the pooled samples 1974–75, 1978–79, 1982–83, and 1988–90. The estimates indicate that the university earnings premium declined from the mid- to the late 1970s and then increased in the 1980s. The university earnings differential shows a pattern of increase in the 1980s that is similar to but smaller in magnitude than the estimated increases in nonmanual/manual differentials from the NES.

In summary, between- and within-group wage differentials for both men and women narrowed in Britain from the late 1960s to the late 1970s and then expanded tremendously in the 1980s. Our results from the NES concerning overall and within-group changes in inequality for males are quite similar to Schmitt's (chap. 5 in this volume) findings from the GHS for 1974–88.

1.2.3   Changes in the Structure of Wages in Japan

We use data from the Basic Survey on Wage Structure to analyze changes in the Japanese wage structure.[15] These wage data are compiled from wage

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15. For a further analysis of changes in the Japanese wage structure during the 1980s using data from the Basic Survey on Wage Structure, see Genda (1993).

surveys of nongovernment establishments with ten or more regular workers taken in June of each year. The published wage statistics provide data on mean wages for regular workers by detailed sex-age-education categories and on the tenth, fiftieth, and ninetieth percentile wages of regular workers for sex-age groups. The restriction of the sample to regular workers and the exclusion of small establishments (those with fewer than ten regular worker) means that the Basic Survey on Wage Structure misses a substantial fraction of the Japanese labor force. These exclusions are probably more important for women than for men. We focus on monthly scheduled earnings as our basic wage measure since this is the most readily available measure for education-age cells. Katz and Revenga (1989) and Davis (1992) find that levels of inequality and wage differentials are larger when a more comprehensive measure of earnings that includes overtime earnings and special payments (bonuses) is used but that trends in wage differentials are quite similar for monthly scheduled earnings and total monthly earnings.[16]

Figure 1.5 summarizes basic changes in the pattern of Japanese relative wages from 1967 to 1990. Panel A graphs fixed-weighted averages of log college/high school wage ratios for male age and experience groups.[17] The college/high school wage differential by age group compares the earnings of persons from the same high school class who went on to attain a degree to those who did not. The analogous differential by experience group compares the earnings of college graduates and high school graduates who entered the labor market at the same time. The college log wage premium for those of the same age fell moderately from 0.23 in 1967 to a trough of 0.17 in 1984 and expanded slightly to 0.19 in 1990. The college/high school wage differential by experience group is essentially flat from 1974 to 1990. But panel B of figure 1.5 illustrates that relative earnings of college graduates did improve markedly for new entrants from 1974 to 1990. The log difference between the starting salary of new entrant college graduates and high school graduates increased from 0.15 in 1974 to 0.26 in 1990. The shortage of young workers in Japan since the early 1970s does seem to have created pressures in the labor market favoring young college graduates in the new entrant labor market. This finding is not surprising given the immobility of workers in Japan once they have entered the internal labor market of firms of at least moderate size.

Panel C shows that Japan does have a different pattern of changes in experience differentials than do Britain and the United States. Although experience

16. We have also analyzed changes in wage differentials for men over the period 1967–87 using hourly total earnings. The patterns are quite similar to those for scheduled monthly earnings. We use monthly earnings because we do not have hours data beyond 1987.

17. The age groups are twenty to twenty-four, twenty-five to twenty-nine, thirty to thirty-nine, forty to forty-nine, and fifty to fifty-nine. The experience groups cover workers with approximately one to two, three to seven, eight to twelve, thirteen to seventeen, eighteen to twenty-two, twenty-three to twenty-seven, twenty-eight to thirty-two, and thirty-three to thirty-seven years of potential experience. The fixed weights are the average share of each age (or experience) group in total male employment over the period 1967–90.

A. Returns to College for Males by Age and Experience

B. College/Upper Secondary Log Wage Ratio in Starting Pay for New Entrants

C. Returns to Experience for Males by Education

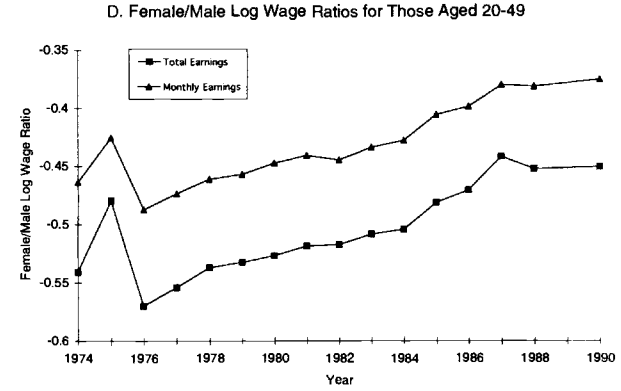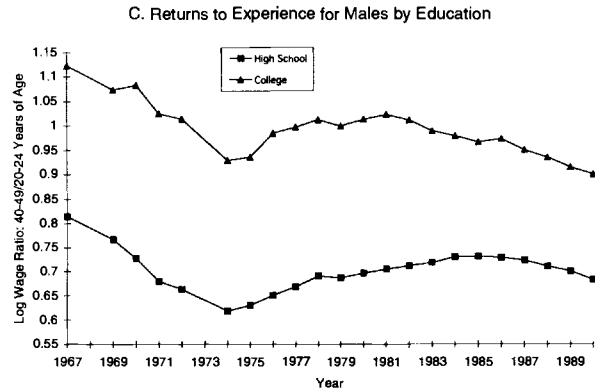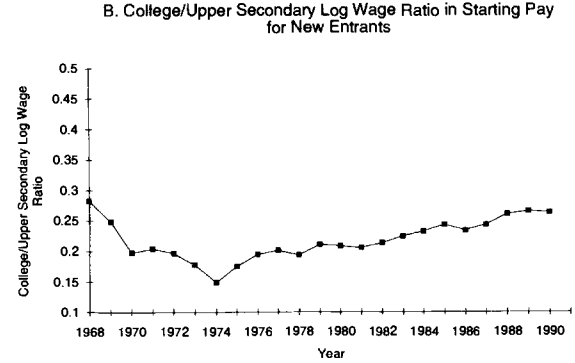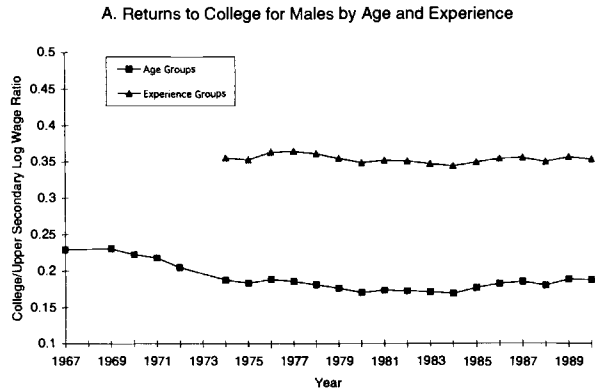## D. Female/Male Log Wage Ratios for Those Aged 20-49

Fig. 1.5   Japan, wage structure changes, 1967–90

differentials increased from the mid-1970s to the early 1980s for males in all three countries, experience differentials declined both in the late 1960s and in the late 1980s in Japan. In fact, Japan is distinct among the countries studied in having a smaller earnings gap between prime age and young males in the late 1980s/early 1990s than in the late 1960s/early 1970s.

Panel D graphs fixed-weighted averages of female/male log wage ratios for six five-year age groups covering workers aged twenty to forty-nine years. The different patterns of educational attainment of men and women in Japan have led us not to adjust for educational attainment in making these comparisons. The figure shows a fairly substantial narrowing of the gender earnings gap among regular workers from 1976 to 1988.

Thus, changes in education and gender wage differentials in Japan in the 1980s are qualitatively similar to but much smaller in magnitude than the analogous changes in the United States. In Japan, education differentials increased slightly overall and moderately for new entrants. The bigger increase in education differentials for young workers is similar to the U.S. pattern. The reversal of a pattern of rising experience differentials to one of shrinking experience differentials by the late 1980s is more extreme in Japan than in the United States. Unfortunately, we do not have data on wage distributions within sex-age-education cells to look at within-group inequality measures in Japan that are similar to those that we can compute for our other countries.

1.2.4   Changes in the Structure of Wages in France

French data on mean wages by gender, occupation, industry, and age come from the Declarations Annuelles de Salaires (DAS), which contains data for full-time workers in all private and semipublic firms. While labor income is measured on an annual basis, it is constructed on the basis of a fixed number of hours so that it has a straightforward transformation into an hourly wage measure. The data have been collected annually for many years but were available in published form from 1967 to 1987.[18] No data collection took place in 1981 or 1983, so these years are missing from the time series. While detailed occupation data are available in the DAS, there was a significant redefinition of occupations beginning in 1984 that makes detailed comparisons problematic. Aggregating occupations into nonmanual and manual categories eliminates nearly all the incompatibilities.

Data on wage distributions by sex and by sex-occupation groups for the periods 1967–82 and 1984–87 are available from two analogous data sets from the DAS. These data sets cover all full-time workers in private and semipublic firms born in October of even-numbered years—roughly 4 percent samples of the covered working population.

Figure 1.6 summarizes between-group changes in the French wage structure for the period 1976–87 and within-occupation changes for the period 1967–87.

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18. Provisional data for 1987–90 on wages by decile are available from OECD (1993).

A. Nonmanual/Manual Log Wage Ratios by Sex, 21-60 Years Old

B. Returns to Experience for Males

Fixed Weighted Average of Manual and Nonmanual Differences

C. Gender Differentials by Occupation, 21-60 Years Old

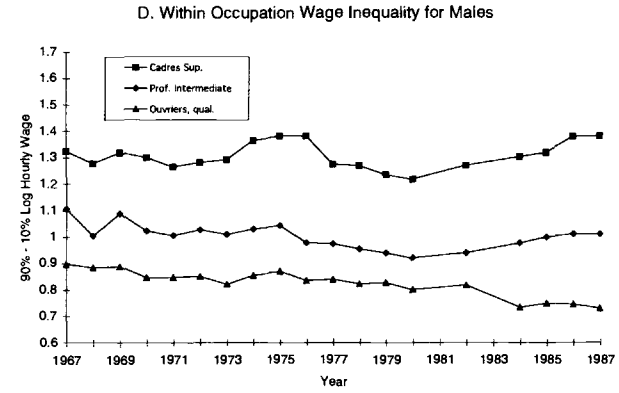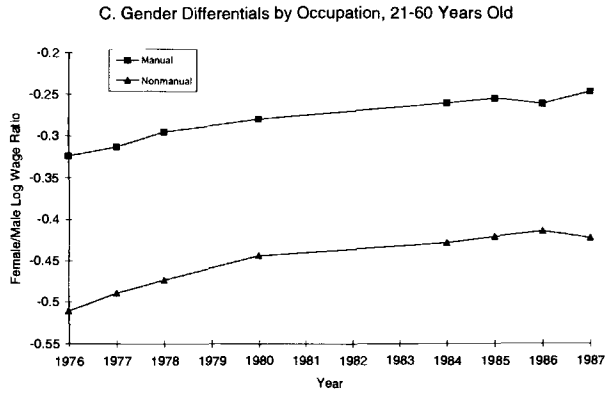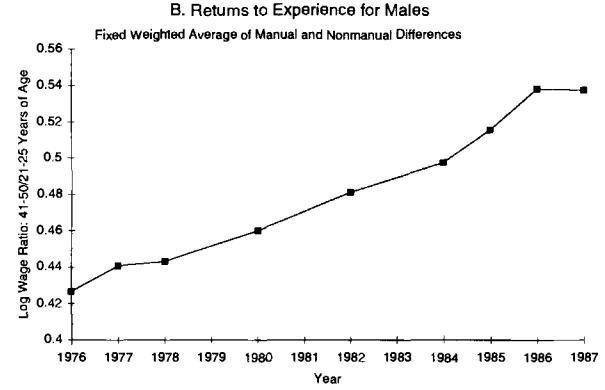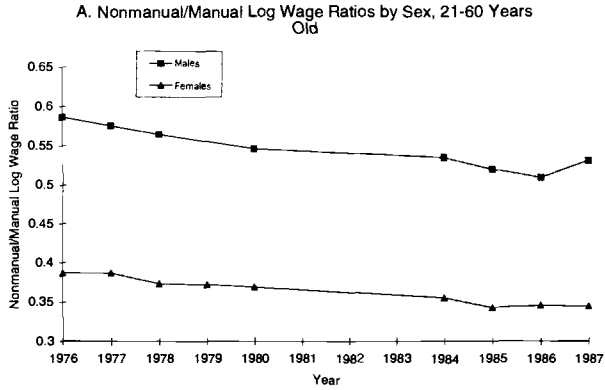**D. Within Occupation Wage Inequality for Males**

Fig. 1.6   France, major changes in wage structure

Panel A shows movements in the nonmanual/manual differential by sex. The figure graphs fixed-weighted averages of the differences in the log of the mean hourly wages of nonmanual and manual workers in eight age groups for each sex.[19] The nonmanual/manual differential narrows from the mid-1970s through the mid-1980s, with a minor uptick at the end of the sample period. This contrasts with the British experience of a sharply rising nonmanual wage premium throughout the 1980s. But panel B of figure 1.6 shows that the experience differentials for males in France increased in a fashion quite similar to the analogous measure for British males (shown in panel B of fig. 1.4 above). Female/male log wage differentials by broad occupation (as measured by fixed-weighted averages of the female/male log hourly wage ratio for eight age groups) show a narrowing in France of 0.08 for manual and 0.09 for nonmanual workers from 1976 to 1987. Finally, panel D indicates that within-occupation wage dispersion narrowed substantially for males from the late 1960s to 1980. In the 1980s, within-occupation inequality measured by the 90–10 log wage differential expanded for professional and managerial occupations (e.g., *cadres superiores*) and narrowed for manual occupations (e.g., *ouvriers*).

1.2.5   Differences and Similarities in Wage Structure Changes

The qualitative features of wage structure changes over the last twenty years in the United States, Great Britain, France, and Japan are summarized and compared in table 1.3. All four countries shared in the common OECD pattern of declining educational and occupational wage differentials in the 1970s. The pattern of narrowing skill differentials reversed itself in three of the countries by the early 1980s and in France starting in 1984. The magnitude of increases in skill differentials in the 1980s is largest in Britain and the United States.[20]

More generally, Britain and the United States show quite similar patterns of substantial increases in between- and within-group wage inequality in the 1980s. The one exception to this pattern is that experience differentials for more educated workers narrowed in the United States in the 1980s. Japan had moderate increases in inequality in the 1980s, and France is the outlier, with no rise in inequality through 1984. Increased wage inequality in France from 1984 to 1987 suggests that wage structure changes similar to those experienced

19. The age groups are twenty-one to twenty-five, twenty-six to thirty, thirty-one to thirty-five, thirty-six to forty, forty-one to forty-five, forty-six to fifty, fifty-one to fifty-five, and fifty-six to sixty. The fixed weights are the average employment shares of each age group over the sample.

20. Differences in education systems mean that the best way to compare the magnitude of skill differential changes in France, Britain, and the United States is to examine changes in analogous occupational wage differentials. Appendix table 1A.2 compares changes in nonmanual/manual wage differentials by age-sex groups in Britain, France, and the United States using as comparable as possible earnings data and occupation classification systems. Differences in the organization of work and similarities in education distributions for males mean that educational earnings differentials are more comparable in the United States and Japan than are occupational wage differentials. Katz and Revenga (1989) compare changes in college/high school wage differentials in Japan and the United States.

Table 1.3   **Wage Structure Changes in Four OECD Countries: The Scorecard**

	1970s				1980s			
	United States	Britain	France	Japan	United States	Britain	France	Japan
Male:								
Overall inequality	↑↑	↓↓	↓↓		↑↑	↑↑	↑	↑↑
Within inequality	↑↑	↓↓	↓↓		↑↑	↑↑	↔	
Education/occupation	↓↓	↓↓	↓↓	↓↓	↑↑	↑↑	↔	↑
Experience:								
College/nonmanual	↑↑	↔		↑	↓	↑↑	↑↑	↓↓
≤ High school/manual	↔	↔		↑	↑↑	↑↑	↑↑	↔
Female:								
Overall inequality	↔	↓↓	↓↓		↑↑	↑↑	↑	↑↑
Within inequality	↑	↓↓	↓↓		↑↑	↑↑	↔	
Education/occupation	↓↓	↓↓	↓↓		↑↑	↑↑	↔	
Female/male	↔	↑↑	↑		↑↑	↑	↑↑	↑↑

Note: ↑↑ = increases by a substantial magnitude; ↑ = small increase; ↔ = no change; ↓ = small decrease; and ↓↓ = large decrease; a blank space signifies insufficient information.

by the other countries in the early 1980s may be occurring with a lag in France. U.S. males are the only group for whom overall wage inequality was probably already increasing in the 1970s. France and Britain share a pattern of decreasing wage dispersion in the 1970s. Finally, the relative earnings of females improved in all four countries over the last twenty years, although the time patterns of the changes are fairly heterogeneous.

1.3 Supply and Demand Factors

We begin our investigation into the causes of the between-group relative wage changes documented in the previous section using a simple supply and demand framework in which different demographic groups (identified by sex, age, and education) are viewed as distinct labor inputs. We initially abstract from the effects of labor market institutions on wage setting and think of the relative wages of demographic groups in each country as being generated by the interaction of relative supplies of the groups and an aggregate production function with its associated factor demand schedules. To the extent that different demographic groups are imperfect substitutes in production, we can view changes in relative wages as being generated by shifts in relative numbers of workers in each group and shifts in relative demand schedules. Changes in the age structure and educational attainment of the population as well as changes in female labor force participation rates may affect the wage structure by altering the relative supplies of imperfectly substitutable groups of workers. Shifts in the structure of product demand and skill-biased technological change are likely to affect relative labor demands. In this section, we examine the extent to which changes in the relative numbers of workers by education and changes in relative demands associated with industry shifts in employment can help explain cross-country differences in relative wage changes.

1.3.1 Relative Supply Changes

Much research on the U.S. wage structure concludes that substantial secular growth in the demand for "more educated" and "more skilled" workers is necessary to rationalize the persistence of substantial educational wage differentials in the face of a rapid growth in the fraction of highly educated workers in the U.S. labor force (e.g., Bound and Johnson 1992; and Murphy and Welch 1992). Freeman (1981) argues that trend growth in the relative demand for college-educated workers is required to explain patterns of changes in the relative wages and quantities in most OECD economies through the end of the 1970s. Under the stark hypothesis that the relative demand for college graduates grows at a relatively steady trend rate (perhaps because of a steady pace of industrial shifts and technological changes favoring the more skilled), changes in the college wage premium should be inversely related to changes in the rate of growth of the relative supply of college graduates. Katz and Mur-

phy (1992) find that a simple hypothesis of this type does a fairly good job of explaining movements in U.S. educational wage differentials over the last thirty years. This approach suggests that differences in the rate of growth of the supply of highly educated workers in the 1970s and the 1980s may help explain a fairly general pattern of narrowing education differentials in the 1970s and expanding differentials in the 1980s.

Table 1.4 provides summary information on changes in the fraction of the labor force (or adult population) with college educations in the United States, Britain, France, and Japan over the last two decades. The rate of growth of college-educated workers was quite rapid in all four countries in the 1970s. The expansion of the availability of higher education and large baby-boom cohorts fueled the furious pace of relative supply growth over this period. The rate of growth of the relative supply of highly educated workers decelerated substantially in the United States, Britain, and Japan in the 1980s. The relative earnings of university graduates declined in each of these countries during the 1970s, when supply growth was fastest, and expanded in each of these countries in the 1980s, when supply growth was much slower. Relative supply growth slowed down in the 1980s in these three countries both when measured as the annual average change in the log share of college graduates and when measured as the annual average change in the percentage share of college graduates.

Under the assumption that the elasticity of substitution between college-educated and non-college-educated workers in the United States is in Freeman's (1986) preferred one to three range, the slowdown in the rate of growth of college graduates in the United States from the 1970s to the 1980s can explain an increase in the college/high school log wage differential from 1979 to 1989 of 0.06 to 0.20. In fact, the U.S. college/high school log wage ratio for all males (panel A of fig. 1.3 above) increased by 0.14 from 1979 to 1989. If the degree of substitutability of college and other workers is at the low end of existing estimates, then changes in the rate of growth of the relative supply of college workers in the 1980s are sufficient by themselves to explain observed increases in the college wage premium in the United States, Britain, and Japan. Thus, differences in the rate of growth of the relative supply of highly educated workers in the 1970s and 1980s may be an important part of the explanation for declining skill differentials in the 1970s and rising skill differentials in the 1980s.

Table 1.4 further indicates that the one country in which education/occupation differentials do not appear to have expanded in the 1980s, France, is also the country in which the log relative supply growth of college graduates appears to have decelerated the least in the 1980s. The evidence for whether any deceleration at all occurred in the growth of the log relative supply of college workers in France in the 1980s is somewhat ambiguous. One gets different answers for choices of slightly different years and different samples (e.g., the adult population vs. the adult labor force).

Table 1.4   Relative Supplies of College-Educated Workers in Four Countries

Group and Ages	% with College Education			Annual Log Growth Rates	
	1969	1979	1989	1969–79	1979–89
United States:					
Employees:					
Males, 18–64	14.5	21.9	26.6	.041	.019
Females, 18–64	10.4	16.8	23.2	.048	.032
Males & females, 18–64	13.0	19.9	25.1	.043	.023
Population:					
Males, 18–64	13.8	19.8	24.0	.036	.019
Females, 18–64	8.3	13.5	19.2	.049	.035
Males & females, 18–64	10.8	16.6	21.5	.043	.026
	1973	1979	1989	1973–79	1979–89
Britain:					
Population:					
Males, 16–60	9.6	14.5	21.0	.069	.037
Females, 16–60	6.5	9.6	13.9	.065	.037
Males & females, 16–60	8.0	12.0	17.4	.068	.037
Employees:					
Males, 16–60	10.1	15.7	23.9	.074	.042
Females, 16–60	7.7	10.8	17.4	.056	.048
Males & females, 16–60	9.1	13.6	21.0	.068	.037
	1970	1980	1989	1970–80	1980–89
France:					
Population:					
Males, 15+	5.3	8.3	11.8	.045	.039
Females, 15+	5.3	6.9	10.4	.026	.046
	1975	1982	1987	1975–82	1982–87
Labor force:					
Males, 15+	7.8	10.1	13.2	.037	.054
Males & females, 15+	8.3	10.9	14.0	.039	.050
	1970	1979	1990	1970–79	1979–90
Japan:					
Regular employees:					
Males, All	11.1	18.9	25.1	.059	.026
	1971	1979	1987	1971–79	1979–87
All employees:					
Males, 15+	15.1	21.0	25.6	.041	.025
Males & females, 15+	12.0	17.9	22.5	.050	.029

Table 1.4   (continued)

Sources: United States: March Current Population Surveys; Britain: General Household Surveys; France: INSEE, "Tableaux de l'economic francais," various years; Japan: Basic Survey on Wage Structure for regular employees in establishments with ten or more regular employees; Employment Status Survey for all employees.

Note: College-educated workers are defined as follows: United States: college graduates (those with sixteen or more years of schooling); Britain: individuals with post-A-level qualifications (i.e., higher degrees, Higher National Diploma [HND]/Higher National Certificate [HNC], teaching, nursing, and professional qualifications, etc.); France: university graduates (those with higher degrees beyond a baccalauréat); Japan: university graduates for regular employees; those with at least some college including junior college for all employees.

1.3.2   Relative Demand Shifts

It is clear that substantial shifts in relative demand favoring more educated and more skilled workers are necessary to explain patterns of changes in wage structures in most OECD countries over the postwar period. One explanation for patterns of changes in education/skill differentials is that relative demand for more educated workers has grown fairly steadily and that variations in changes in skill differentials across periods are driven by changes in the rate of growth of the relative supply. This explanation is fairly consistent with the observed time series for the United States under the assumption of fairly low substitutability between college and less educated workers. But the 1980s deceleration in the rate of growth of the relative supply of college graduates in many countries is not a sufficient explanation for the observed increases in educational wage differentials if the degree of substitutability is in the high range of plausible estimates. Furthermore, sharp increases in experience differentials for less educated workers in the early 1980s, a period of small entering cohorts of less educated workers, do not seem to fit into a picture of smooth changes in relative skill demands throughout the last twenty years. An alternative set of explanations focuses on an acceleration in the rate of growth of relative demand for more skilled workers possibly arising from an increased pace of technological changes, foreign outsourcing of production jobs, or the decline of the manufacturing sector.

We find it useful to think of relative demand shifts as coming from two types of changes: those that occur within industries (i.e., shifts that change relative factor ratios at fixed relative factor prices) and those that occur between industries (i.e., shifts that change the allocation of labor demand across industries at fixed relative wages). Sources of within-industry shifts include skill-biased technological change, outsourcing, and changes in the prices of nonlabor inputs (e.g., computers). Between-industry shifts may be driven by shifts in product demand across industries, differences across industries in factor-neutral technological change, and shifts in net international trade.

The well-documented finding that the share of employment of college graduates and women increased inside almost every two-digit industry in the

United States over the past three decades despite increases in the relative prices of college graduates and females suggests that important shifts in relative demand have occurred within detailed industries. The rate at which U.S. employment shifted toward more educated and nonproduction workers within detailed industries also appears to have accelerated somewhat (especially in the manufacturing sector) during the 1980s (Berman, Bound, and Machin 1994; Katz and Murphy 1992). Similar changes in factor ratios within broad one-digit industries are apparent in our examination of British data from the Labour Force Survey for the 1980s. Nevertheless, Berman, Bound, and Machin (1994) find that, in contrast to the U.S. experience, the rate of employment shifts from production to nonproduction workers within detailed manufacturing industries actually decelerated somewhat in Britain and Japan from the 1970s to the 1980s. The increased pace of within-sector skill upgrading in a period of rising relative prices of more skilled workers suggests that an acceleration in within-industry relative demand growth favoring the more skilled plays some role in rising U.S. educational/occupational wage differentials in the 1980s. The limited available direct evidence on changes in factor ratios in British and Japanese manufacturing is less consistent with an acceleration in the pace of skill-biased technological change in the 1980s explaining the very different evolution of wage differentials in the 1970s and 1980s.

The effects of between-industry shifts in labor demand on the relative demands for different skill and demographic groups depend on group differences in industrial employment distributions. Shifts in industrial employment will shift relative labor demands if sectors differ in their intensity of use of different types of workers. The data that we have available for the United States, Britain, and Japan all indicate that input coefficients for different education groups and for men and women differ systematically across industries in a similar manner in each country. Less educated workers are overrepresented in agriculture, construction, mining, and many manufacturing sectors. College graduates are overerrepresented in professional and related services, finance, insurance and real estate, and some high-technology manufacturing sectors.

Major industrial employment shifts in each country are illustrated in table 1.5. France, the United Kingdom, and the United States all experienced a sharp decline in the share of employment in goods-producing industries (mining, manufacturing, construction, and utilities) in the 1970s and the 1980s. These employment shifts are likely to have led to a shift in relative demand against less skilled workers. The relative decline of employment in goods-producing industries over the entire period was comparable in the United States and France but was significantly larger in the United Kingdom. Japan is an outlier in the other direction: it maintained a stable share of employment in manufacturing throughout the 1970s and 1980s. The shifts illustrated in table 1.5 suggest an acceleration in the pace of between-industry demand shifts against the less skilled in the 1980s in Britain and France. The broad changes in the indus-

Table 1.5   **Sectoral Employment Shares, 1965–89**

	1965	1970	1975	1980	1985	1989
United States:						
Agriculture	6.3	4.5	4.1	3.6	3.1	2.9
Industry	35.5	34.4	30.6	30.5	28.0	26.7
Services	58.2	61.1	65.3	65.9	68.8	70.5
Britain:						
Agriculture	3.8	3.2	2.8	2.6	2.5	2.2
Industry	46.6	44.7	40.4	37.7	31.6	29.3
Services	49.6	52.0	56.8	59.7	65.9	68.5
Japan:						
Agriculture	23.5	17.4	12.7	10.4	8.8	7.6
Industry	32.4	35.7	35.9	35.3	34.9	34.3
Services	44.1	46.9	51.5	52.4	56.4	58.2
France:						
Agriculture	17.8	13.5	10.3	8.7	7.6	6.4
Industry	39.1	39.2	38.6	35.9	32.0	30.1
Services	43.1	47.2	51.1	55.4	60.4	63.5

Source: OECD (1991).

trial distribution of employment in each of the four countries are also likely to have favored women over men.

We next attempt to determine more systematically whether changes in the industrial composition of employment led to an acceleration in the rate of decline in relative demand for less educated workers in the 1980s. We use standard fixed-coefficient relative demand shift indices to measure how changes in the industrial mix of jobs in the United States, Britain, and Japan have affected the relative demand for workers by sex-education categories in the 1970s and in the 1980s. We specify an index of the demand for the labor of the jth group of workers in year t as

$$(1) \qquad\qquad E_{jt} = \sum_i \alpha_{ij} E_{it},$$

where E_{it} is total employment in industry i in year t and α_{ij} is the fixed coefficient relating the number of workers in group j to total employment in industry i under fixed technology and fixed relative factor prices. Since we are concerned with changes in relative demands, we normalize both sides of equation (1) by dividing through by aggregate employment at time t (E_t) to yield the index of the relative demand for group j given by

$$(2) \qquad\qquad e_{jt} = \sum_i \alpha_{ij} e_{it},$$

where $e_{jt} = E_{jt}/E_t$ and $e_{it} = E_{it}/E_t$. We measure the log change in the relative demand for group j as $\Delta \ln (e_{jt})$. This approach to measuring relative demand shifts arising from sectoral employment shifts can be justified either as a fixed-coefficients "manpower requirements" index (Freeman 1986) or as an approxi-

mation to "true" factor demand shifts for more general production functions (Katz and Murphy 1992).

To implement this approach to measuring demand shifts in as comparable a manner as possible in different countries, we divide the economies of each country into nine one-digit industries and divide the labor forces into six to eight sex-education groups. We use separate estimates of the α_{ij}'s for each country. We measure α_{ij} as group j's share of total employment in sector i in a base period.[21] We measure changes in industrial employment shares (changes in e_{it}'s) for each country on a comparable basis using the one-digit industrial employment distributions reported by the OECD (OECD 1991). Although important industrial shifts occurring within one-digit industries are missed by our measure of between-industry demand shifts, this approach does provide a way to gauge differences across countries and time periods in the extent that broad changes in industry mix have affected the relative demands for different groups of workers.

Table 1.6 presents changes in our relative demand shift measures over the periods 1969–79 and 1979–89 for eight demographic groups in the United States and six demographic groups in Britain and Japan.[22] Measured between-industry demand shifts are monotonically increasing for both men and women in all three countries in both time periods. Between-industry shifts also favored women relative to men in every education group for all three countries. The magnitude of demand shifts against less educated workers increased in Britain in the 1980s, appears fairly steady across the two decades in the United States, and decreases in Japan in the 1980s. The large magnitude of the relative demand shifts in Japan in the 1970s is driven by the sharp decline in agriculture's share of employment. Japan's strength in manufacturing in the 1980s meant a smaller between-industry shift in relative labor demand against high school (upper secondary) males in Japan than in Britain or the United States. Overall, the between-industry shifts are consistent with a pattern of trend increases in the relative demand for highly educated workers. The estimates also indicate that the sharp contrast in the labor market performance of less educated young workers in Britain in the 1970s and 1980s may be associated with the particularly sharp acceleration in the pace of deindustrialization in that country in the early 1980s.

Since educational earnings differentials expanded and gender earnings dif-

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21. The base period in each country was chosen so that the α_{ij}'s would reflect average production technologies in the 1980s. The base years for each country are 1979, 1984, and 1989 for the United States; 1979, 1983, 1987, and 1989 for Britain; and 1979 and 1987 for Japan. Experimentation with U.S. data indicates that estimated shifts in relative labor demands are not very sensitive to the choice of base year over the period 1967–89. The α_{ij}'s were calculated using data on employment status, industry, education, and sex from household surveys in each country: the CPS ORGs for the United States; the Labour Force Survey for Britain; and the Employment Status Survey for Japan.

22. Unfortunately, we do not have the necessary data to calculate analogous measures for France.

Table 1.6   **Industry-Based Demand Shift Measures, 1969–89**

	Change in Log Relative Demand			
	Males		Females	
Education Group	1969–79	1979–89	1969–79	1979–89
United States:				
Dropouts	−.044	−.048	−.003	−.009
High school graduates	−.036	−.041	.023	.025
Some college	−.011	−.012	.046	.047
College graduates	.016	.019	.057	.054
Britain:				
No qualifications	−.072	−.097	.028	.000
A-levels, O-levels, etc.	−.039	−.041	.069	.084
College	.026	.059	.102	.119
Japan:				
Lower secondary	−.066	−.057	−.128	−.054
Upper secondary	.035	.007	.032	.028
College	.098	.054	.107	.073

Note: The between-industry demand shift measure for group j is given by $\Delta \ln(e_{jt})$ where $e_{jt} = \sum_i \alpha_{ij} e_{it}$, α_{ij} is group j's share of total employment in sector i in the base period, and e_{it} is industry i's share of total employment in year t. i indexes nine one-digit industries for the United States and Japan and eight one-digit industries for Britain.

ferentials narrowed in each of these countries in the 1980s, the actual between-sector demand shifts that would have occurred at fixed relative factor prices are likely to be greater than those suggested in table 1.6. Additionally, the use of highly aggregate one-digit industry categories is likely to lead us to understate the magnitude of between-industry relative demand shifts. When we use two-digit industry data for Japan and the United States, we find that relative demand shifts across education-gender groups have a similar pattern to the one-digit estimates presented in table 1.6 but are almost twice as large in magnitude.

In summary, simple supply and demand factors appear to go a reasonable way toward explaining differences in changes in the wage structure across time periods and countries. A significant slowdown in the growth rate of the relative supply of college graduates occurred in the United States, Britain, and Japan. This reduction in the pace of the growth of the supply of highly educated workers, combined with steady demand growth favoring such workers, provides a consistent explanation for declining education differentials in the 1970s and a rapid growth of education differentials in the 1980s in Britain and the United States. An acceleration in the pace of between-industry demand shifts also appears in these two countries, with massive increases in wage inequality in the 1980s. The rate of within-industry skill upgrading appears to have accelerated in the United States during the 1980s. France's stable skill differentials may relate to a continuation of a rapid growth of the relative supply of highly edu-

cated workers in the 1980s. Nevertheless, the much earlier appearance of rising inequality in the United States than in the other three countries and the extent to which France's wage structure behaved differently than those of the others in the 1980s do suggest that differences in labor market institutions may play a major role in explaining the differential responses of national wage structures to common relative skill demand shifts.

1.4   The Role of Labor Market Institutions

The much different behavior of the pattern of relative wages in France than in the other three countries in the 1980s in a period of substantial industrial employment shifts in France does point to the possibility that French labor market institutions somewhat offset the effects of relative demand shifts on skill differentials. The outstanding features of the French wage data are that differentials across occupation groups failed to increase substantially in the 1980s, wage inequality did not increase significantly overall or within most groups, and real incomes grew substantially, particularly for manual workers.

There are two important and interrelated labor market institutions that may help explain why relative demand shifts led to only quite modest relative wage changes in France: the collective bargaining system and the minimum wage. Collective bargaining in France has taken place mainly at the industry level since 1950, when a law was passed favoring industry-level bargaining between national employers' federations and national unions. Accordingly, the four large unions in France, and a few smaller ones, are organized on an industry basis. There are no majority representation criteria as in the United States. The French unions have the authority to bargain collectively on behalf of the employees in an industry, even though only a small portion of the employees are members of any particular union. Under the terms of the law, industry-level agreements may be extended by the minister of labor to all firms in the industry—even those that are not members of the employers' federation.

French workers are not obliged to join unions to receive the benefits of negotiated agreements. Since dues are collected on an individual basis and are not deducted automatically by the employer, membership statistics are poor, and the unions must make estimates on the basis of total dues revenues. Nonetheless, it is clear that union density has fallen significantly, from roughly 24 percent in the 1970s to less than 15 percent in the late 1980s. The membership of the most militant union, Confederation Generale du Travail, is estimated to have dropped by more than 60 percent from 1976 to 1987 (Bridgford 1990).

The membership figures, however, do not portray union influence accurately. Support for the unions is better measured by their candidates' success in elections for positions on industrial tribunals and enterprise committees.[23] While

23. Industrial tribunals hear claims of unjust and illegal actions by employers against employees. Enterprise committees are responsible for social activities and labor-management consultation.

the percentage of votes cast for union candidates has declined since the 1970s, Bridgford (1990) reports that they still receive nearly 50 percent of the votes for industrial tribunals and nearly 80 percent of the votes for enterprise committees. Moreover, industry-level agreements negotiated by the unions and employer federations are routinely extended to all firms in the industry with the result that unions exert significant influence on the terms and conditions of employment throughout most industries. Data from 1981 show that nearly 80 percent of all firms and nearly 90 percent of all workers were covered by industry-level agreements (Eyraud and Tchobanian 1985; and Caire 1984). The industry-level agreements determine minimum wages for each job category. Companies may, and often do, chose to pay more, especially for the more highly skilled jobs, but the negotiated minima represent a constraint that applies to firms of all sizes throughout an industry.[24]

The second key labor market institution is the legislated minimum wage, or SMIC (*salaire minimum interprofessional de croissance*). The SMIC, which applies to essentially all sectors with few exemptions or abatements, is a very considerable constraint on the wages of the young or less skilled. Begun in 1950 when wartime wage controls were lifted, the SMIC is adjusted automatically for inflation and occasionally changed in real terms by the federal government. Indeed, the legislation enacting the SMIC referred to it, not as a subsistence wage, but rather as a social policy tool intended to help poorly paid workers share in economic growth (OECD 1985). Brazen and Martin (1991) estimate that 12 percent of all wage and salary earners were paid at or below the SMIC in 1987 and that this percentage had risen significantly since the 1970s. Only about 5 percent of all U.S. wage and salary workers were paid at or below the federal minimum wage ($3.35 per hour) in 1988, and this fraction has declined significantly since 1981 (Haugen and Mellor 1990). The SMIC has been at least 60 percent of the mean wage since 1978 and has actually increased significantly since then in terms of the mean wage (Katz and Loveman 1990). Figure 1.7 shows that the SMIC has also increased relative to wages for unskilled workers for the past twenty years. The increase was most dramatic in the early 1980s, when wage differentials were rising sharply in the United States and Britain and starting to rise in Japan. An especially sharp rise in the SMIC in the early 1980s followed the election of the socialists in 1981. The socialist government pursued an economic policy that featured increases in the SMIC as a means of increasing purchasing power for lower-income workers. From July 1980 to July 1984, the government increased the SMIC in real terms by 14 percent, while average real hourly wages rose by just over 6 percent.

These substantial relative increases in the SMIC tightened wage differentials at the lower end of the distribution. Using our data on French earnings distribu-

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24. Hence, large firms typically cannot significantly reduce labor costs by subcontracting to small producers.
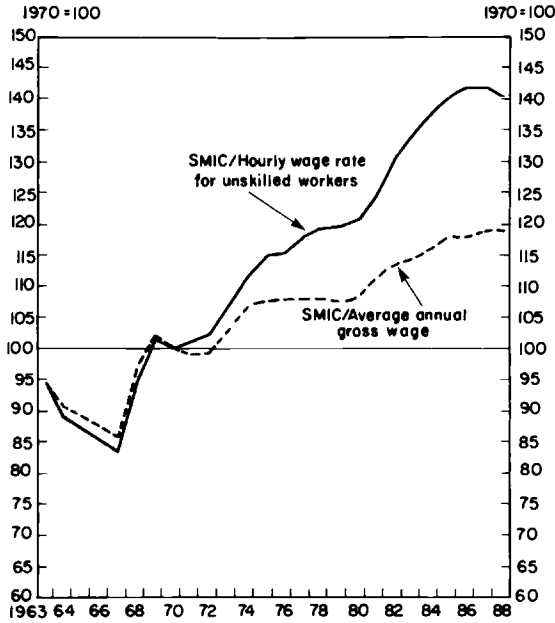
Fig. 1.7   Evolution of statutory minimum wages in France
Source: OECD, *Main Economic Indicators* and *Quarterly National Accounts.*
Note: The statutory minimum wage is the SMIC (*salaire minimum interprofessionnel de croissance*).

tions from the DAS, we estimate that from 1979 to 1987 the SMIC increased from 45.7 to 53.3 percent of the median earnings and from 73.3 to 84.4 percent of the tenth percentile earnings of full-time French male employees. In fact, from 1967 to 1987, the SMIC increased from 75 to 101 percent of the tenth percentile hourly earnings of full-time female workers in the DAS sample. In contrast, the U.S. federal minimum wage remained fixed at a nominal value of $3.35 per hour from 1981 to 1990 and declined in real and relative value throughout the 1980s. We use our March CPS wage samples to estimate that the U.S. minimum wage declined over the period 1979–87 from 40.1 to 30.3 percent of the median and from 82.3 to 69.7 percent of the tenth percentile hourly wage of male, full-time employees in the United States. The SMIC appears to have helped prevent a sharp erosion of real wages at the low end of the French wage distribution.

When the SMIC does not bind on the wages of the less skilled, the industry-negotiated minima do. In some industries, the base (minimum) wage is set equal to the SMIC, while in others, such as metalworking, it is set as a multiple of the SMIC. In either case, changes in the SMIC shift the entire wage distribution. The potential influence of unions and the SMIC on wages in the lower

half of the French earnings distribution is highlighted in table 1.7, which shows three measures of overall wage inequality for our four countries for selected years from 1979 to 1989. The table indicates that the bottom half of the French wage distribution for men (as measured by the log wage gap between the fiftieth and the tenth percentiles) is much more compressed relative to the top half (as measured by the log wage gap between the ninetieth and the fiftieth percentiles) than in the other three countries. The 50–10 differential narrowed a bit for both men and women in France in the period of the rapid rise in the value of the SMIC from 1979 to 1984, while the 50–10 gap was rising for both sexes in the United States and Britain and for men in Japan.

While negotiated and legislated minima have maintained the relative wages of the less skilled with jobs, the employment prospects for young, less skilled people deteriorated sharply. In 1984, youth unemployment in France was 26 percent, compared to 15 percent in the seven major industrial OECD countries. Likewise, the duration of unemployment in France was much longer than in Germany, the United Kingdom, and the United States (OECD 1985). While one must be cautious in drawing conclusions concerning the effects of the SMIC on the employment of youths and the less skilled from simple time-series patterns, Brazen and Martin (1991) provide some (weak) evidence suggestive of moderate adverse effects of the SMIC on youth employment in France in the early 1980s.

The DAS wage data suggest that there has been some increase in French wage inequality, both within and between groups, since 1984. The Auroux reforms in 1982 began a process of change in French industrial relations that favors enterprise- or plant-level negotiations over industry-wide negotiations. The reforms require unions and firms to negotiate wages and other matters annually, but they do not require the completion of an agreement. As this legislation matured during the 1980s, negotiations over substantive issues, including wages, have become increasingly decentralized, but agreements remain largely at the industry level. These changes have moved France closer to the U.S. model of low union membership and decentralized negotiations and may have played a role in the modest increases in wage inequality since the mid-1980s.

1.5 Conclusion

This paper has examined similarities and differences in patterns of changes in the structure of wages in the United States, Britain, Japan, and France over the last twenty years. Educational and occupational wage differentials narrowed in all four countries in the 1970s. This pattern reversed itself with increases in skill differentials in the United States, Britain, and Japan in the early 1980s, and a muted but somewhat similar pattern appears to emerge in France starting in 1984.

Reductions in the rate of the growth of the relative supply of college-

Table 1.7   **Alternative Measures of Wage Inequality for Four Countries, 1979–90**

	1979	1984	1987	1990
Males:				
90-10:				
United States	1.23	1.36	1.38	1.40
Britain	.88	1.04	1.10	1.16
France	1.19	1.18	1.22	1.23
Japan	.95	1.02	1.01	1.04
90-50:				
United States	.56	.66	.68	.69
Britain	.51	.61	.63	.67
France	.72	.73	.76	.77
Japan	.49	.52	.51	.55
50-10:				
United States	.67	.70	.69	.71
Britain	.37	.43	.47	.49
France	.47	.45	.46	.46
Japan	.47	.50	.50	.50
Females:				
90-10:				
United States	.96	1.16	1.23	1.27
Britain	.84	.98	1.02	1.11
France	.96	.93	1.00	1.02
Japan	.78	.79	.84	.83
90-50:				
United States	.55	.63	.61	.67
Britain	.50	.58	.59	.64
France	.53	.52	.54	.55
Japan	.43	.45	.50	.49
50-10:				
United States	.41	.53	.63	.61
Britain	.34	.41	.43	.47
France	.44	.41	.46	.48
Japan	.35	.34	.34	.35

Note: 90-10 refers to the log wage differential between the ninetieth and the tenth percentile workers. The 90-50 and 50-10 differentials are defined analagously. The wage inequality measures refer to log hourly wages for the United States, Great Britain, and France and to log monthly scheduled wages for Japan.

educated workers in the face of persistent increases in the relative demand for more skilled labor can explain a substantial portion of the increase in educational wage differentials in the United States, Britain, and Japan in the 1980s. The earlier appearance of rising overall wage inequality in the United States than in Britain may reflect the power of British unions to oppose the apparently market-driven forces that contributed to rising overall wage inequality among males in the United States in the 1970s. The more severe increases in skill differentials in Britain and the United States than in Japan can be partially

attributed to an acceleration in the rate of growth of the demand for more skilled workers in the 1980s associated with industrial employment shifts out of manufacturing and within-sector skill upgrading. Similar changes in relative skill demands are likely to have occurred in France, but the effect of such changes on wages has been somewhat offset by a high minimum wage and the ability of French unions to extend contracts even in the face of declining membership.

Data Appendix

United States

Data Source 1. Annual Demographic Files, March Current Population Survey (CPS), 1964–90.

Earnings Concept. Hourly wage (annual earnings divided by annual hours) in the year prior to the survey. Annual hours are given by the product of annual weeks worked and usual weekly hours.

Wage Sample. Full-time workers, eighteen to sixty-four years old. The wage sample excludes those in the military, students, agricultural workers, without-pay workers, those who worked fewer than thirteen weeks in the previous year, wage-salary workers with self-employment income, the unincorporated self-employed, and those with allocated income.

Quantity Sample for Measuring Weeks Worked by Different Groups. Excludes those in the military, students, agricultural workers, and without-pay workers.

Remarks. Adjustments for top coding, bracketed weeks and hours variables, and changes in the CPS imputation procedures in 1976 are as in Murphy and Welch (1992). Potential experience is measured as age at the survey date minus years of completed schooling minus seven. The U.S. data used in figure 1.2 above are from Juhn, Murphy, and Pierce (1993) and cover full-time, male workers, aged eighteen to sixty-five years.

Data Source 2. Outgoing rotation groups (ORGs), CPS, all twelve months, 1979–91.

Earnings Concept. Hourly wage (usual weekly earnings divided by usual weekly hours) at current job.

Wage Sample. Full-time workers, eighteen to sixty-four years old. Excludes the self-employed, workers with allocated (imputed) earnings, and those with reported hourly wages of less than $2.00 or more than $100 in 1991 dollars.

Remarks. Top-coded earnings are adjusted upward by a multiplicative factor of 1.36. Earnings from the unedited usual weekly earnings fields with a higher nominal top code are used to measure weekly earnings for workers with top-coded edited earnings in the 1986–88 surveys.

Great Britain

Data Source 1. New Earnings Survey (NES), published volumes for 1968 and 1970–91.

Earnings Concept. Gross hourly earnings.

Wage Sample. Full-time employees, twenty-one or older for males and eighteen or older for females, whose pay was not affected by absence during the survey period.

Remarks. The NES is a sample survey of the earnings of employees in employment in Great Britain in April of each year. It covers a 1 percent random sample of employees who are members of pay-as-you-earn income tax schemes and is designed to represent all categories of employees in businesses of all kinds and sizes.

Data Source 2. General Household Survey (GHS), 1973–90.

Earnings Concept. Gross weekly earnings.

Wage Sample. Full-time employees, sixteen to sixty-nine years old.

Remarks. A CPS-style household survey of ten to fifteen thousand households per year.

Data Source 3. Labour Force Surveys (LFSs), 1979–90.

Earnings Concept. No earnings information is collected.

Remarks. A large CPS-style household survey that does not collect wage formation but is quite useful for the measurement of relative quantities of different types of workers in total employment and by industry.

Japan

Data Source 1. Basic Survey on Wage Structure, published tabulations, 1967–90.

Earnings Concept. Monthly scheduled earnings.

Wage Sample. Regular workers, eighteen to fifty-nine years old, at nongovernment establishments with at least five to ten regular workers (varies by survey year). Excludes agriculture, forestry and fisheries, private household services, and employees of foreign governments.

Remarks. Seventy thousand to one hundred thousand establishments are surveyed in a typical year. The sample excluded the service sector prior to 1973.

Data Source 2. Employment Status Survey, published tabulations, 1971–87.

Earnings Concept. A continuous individual earnings measure is not available.

Remarks. A large national household survey that is useful for measuring quantities. It covers a broader spectrum of workers than does the Basic Survey on Wage Structure.

France

Data Source. Tabulations from the Declarations Annuelles de Salaires (DAS) for 1967–87. No data are available for 1981 or 1983. Provisional updated data on earnings by decile are used for the period 1988–90.

Earnings Concept. Gross annual earnings adjusted for differences among individuals in annual hours worked.

Wage Sample. Full-time, full-year workers in private and semipublic firms.

Remark. Provisional updated data on wages by decile for 1987–90 are from OECD (1993, 159–61). Changes in the 90–10, 90–50, and 50–10 log earnings differentials for men and women for each year from 1987 to 1990 are derived from the provisional updated data. The level of a wage differential for the period 1988–90 is estimated by adding the provisional change in that differential since 1987 to the 1987 level from the definitive data.

Table 1A.1   **Comparative Overview: The United States, Great Britain, France, and Japan (annual growth rates from preceding to current period)**

	1965	1970	1975	1980	1985	1989
United States:						
Real GNP (1965 = 1)	1	1.16	1.30	1.53	1.72	1.94
		(3.0)	(2.3)	(3.3)	(2.3)	(3.0)
Population, 15–64 years						
(millions)	116.6	127.0	138.9	150.8	158.8	163.9
		(1.7)	(1.8)	(1.6)	(1.0)	(.8)
Civilian employment						
(millions)	71.1	78.7	85.6	99.3	101.2	117.3
		(1.9)	(1.7)	(3.0)	(1.5)	(2.3)
Civilian labor force						
(millions)	74.5	82.8	93.7	106.9	115.5	123.9
		(2.1)	(2.5)	(2.6)	(1.5)	(1.8)
Unemployment rate, all	4.4	4.8	8.3	7.0	7.1	5.2
Unemployment rate,						
16–24 years	9.1	9.9	15.2	13.3	13.0	10.5
Britain:						
Real GNP (1965 = 1)	1	1.13	1.27	1.37	1.49	1.73
		(2.4)	(2.3)	(1.5)	(1.7)	(3.7)
Population, 15–64 years						
(millions)	35.0	35.0	35.2	36.1	37.2	37.5
		(.0)	(.1)	(.5)	(.6)	(.2)
Civilian employment						
(millions)	24.8	24.4	24.7	25.0	24.2	26.0
		(−.3)	(.2)	(.2)	(−.7)	(1.8)
Civilian labor force						
(millions)	25.1	24.9	25.6	26.5	27.5	27.8
		(−.1)	(.6)	(.7)	(.7)	(.3)
Unemployment rate, all	1.2	2.2	3.9	6.5	12.4	6.3
Unemployment rate,						
16–24 years	. . .	2.8	8.7	13.5	21.8	N.A.

(continued)

Table 1A.1   (continued)

	1965	1970	1975	1980	1985	1989
Japan:						
Real GDP (1965 = 1)	1	1.79	2.27	2.95	3.56	4.24
		(11.6)	(4.8)	(5.2)	(3.8)	(4.4)
Population, 15–64 years						
(millions)	66.6	71.6	75.6	78.7	82.3	85.5
		(1.4)	(1.1)	(.8)	(.9)	(1.0)
Civilian employment						
(millions)	47.3	50.9	52.2	55.4	58.1	61.3
		(1.5)	(.5)	(1.2)	(1.0)	(1.3)
Civilian labor force						
(millions)	47.9	51.5	53.2	56.5	59.6	62.7
		(1.4)	(.6)	(1.2)	(1.1)	(1.3)
Unemployment rate, all	.9	1.1	1.9	2.0	2.6	2.2
Unemployment rate,						
15–24 years	1.3	2.0	3.0	3.6	4.8	4.5
France:						
Real GDP (1965 = 1)	1	1.30	1.58	1.86	1.97	2.24
		(5.2)	(3.9)	(3.3)	(1.1)	(3.2)
Population, 15–64 years						
(millions)	30.4	31.6	33.0	34.3	36.3	37.0
		(.8)	(.9)	(.8)	(1.1)	(.5)
Civilian employment						
(millions)	19.5	20.3	20.9	21.3	20.9	21.5
		(.9)	(.6)	(.4)	(−.4)	(.7)
Civilian labor force						
(millions)	19.8	20.9	21.7	22.8	23.4	23.8
		(1.0)	(.9)	(.9)	(.5)	(.4)
Unemployment rate, all	1.5	1.8	3.8	6.0	10.1	9.5
Unemployment rate,						
15–24 years	. . .	3.2	7.9	15.0	25.6	19.1

Sources: OECD (1991); and OECD, *Quarterly National Accounts.*

Note: N.A. = not available.

Table 1A.2   Nonmanual/Manual Log Wage Differentials in Three Countries

	Log Nonmanual/ Manual Wage Ratio				
Sex and Age	1978	1984	1987	1991	
United States:					
Male:					
21–24	.143	.268	.298	.352	
25–29	.225	.344	.380	.391	
30–39	.288	.380	.430	.440	
40–49	.305	.392	.428	.496	
50–59	.344	.365	.416	.473	

Table 1A.2   (continued)

Sex and Age	Log Nonmanual/ Manual Wage Ratio			
	1978	1984	1987	1991
Female:				
21–24	.019	.148	.194	.206
25–29	.101	.198	.261	.320
30–39	.266	.318	.354	.411
40–49	.347	.419	.449	.492
50–59	.385	.426	.467	.545
Britain:				
Male:				
21–24	.063	.116	.155	.222
25–29	.247	.290	.341	.402
30–39	.400	.454	.503	.562
40–49	.464	.536	.581	.647
50–59	.457	.533	.576	.610
Female:				
21–24	.139	.225	.215	.305
25–29	.295	.357	.377	.461
30–39	.301	.435	.460	.578
40–49	.305	.395	.396	.531
50–59	.296	.401	.430	.513
France:				
Male:				
21–25	.153	.159	.146	
26–30	.343	.327	.344	
31–35	.529	.446	.457	
36–40	.666	.598	.563	
41–45	.705	.690	.690	
46–50	.746	.702	.714	
51–55	.776	.726	.717	
56–60	.789	.854	.841	
Female:				
21–25	.224	.215	.194	
26–30	.315	.302	.294	
31–35	.379	.346	.325	
36–40	.413	.401	.368	
41–45	.420	.423	.424	
46–50	.430	.398	.411	
51–55	.449	.410	.403	
56–60	.451	.434	.443	

Note: The reported numbers are the logs of the ratio of the mean hourly wages of full-time non-manual and manual workers in each age-sex group. The U.S. data are from the CPS outgoing rotation groups, the British data are from the NES, and the French data are from the DAS.

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