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A COMPARISON OF CHANGES IN THE STRUCTURE OF WAGES IN FOUR OECD COUNTRIES

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ABSTRACT

This paper compares changes in the structure of wages in France, Great Britain, Japan, and the United States over the last twenty years. Wage differentials by education and occupation (skill differentials) narrowed substantially in all four countries in the 1970s. Overall wage inequality and skill differentials expanded dramatically in Great Britain and the United States and moderately in Japan during the 1980s. In contrast, wage inequality did not increase much in France through the mid-1980s. Industrial and occupational shifts favored more-educated workers in all four countries throughout the last twenty years. Reductions in the rate of the growth of the relative supply of college-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. Sharp increases in the national minimum wage (the SMIC) and the ability of French unions to extend contracts even in the face of declining membership helped prevent wage differentials from expanding in France through the mid-1980s.

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I. Introduction

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 governmental 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.[1] Over the past ten years, the U.S. wage structure also changed substantially along several other dimensions: 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, 1992; 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

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[1]See, for example, Katz and Murphy (1992), Levy and Murnane (1992), and Murphy and Welch (1992).

explanations focus on changes in wage-setting institutions such as the declining influence of unions (Freeman, 1991), the erosion of the real value of the minimum wage (Blackburn, Bloom, and Freeman, 1990), and changes in pay-setting norms.

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, 1989; 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 sharply distinguish 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 supply 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 (e.g., minimum wages) may play an important role in understanding differences in the evolution of relative wages across countries.[2]

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 with strong trade performance (Japan). We examine supply and demand and institutional

[2]Recent studies exploiting broad cross-country comparisons to examine alternative hypotheses for changing wage structures Davis (1992) and Gottschalk and Joyce (1992).

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 1987.

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. Within group (residual) inequality has been rising since the late 1960s in the United States. In contrast, within group inequality narrowed in the 1970s in France and Britain.

We find that simple supply and demand measures go a reasonable distance towards 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 mid-1980s (Abraham and Houseman, 1992; Erickson and Ichino, 1992). 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 II contrasts changes in overall wage inequality in these four countries over the last twenty-five years. Section III presents more detailed evidence on changes in the structure of wages in the four countries. Section IV provides supply and demand measures for each country and examines their contribution to changes in the wage structures of the four countries. Section V 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 VI concludes.

II. Changes in Overall Wage Inequality

We begin by contrasting overall movements in wage inequality in France, Japan, the United Kingdom, and the United States.[3] Figure 1 summarizes movements in wage inequality

[3]A summary of aggregate labor market developments from 1965 to 1989 in the four countries is presented in Table A1 of the appendix.

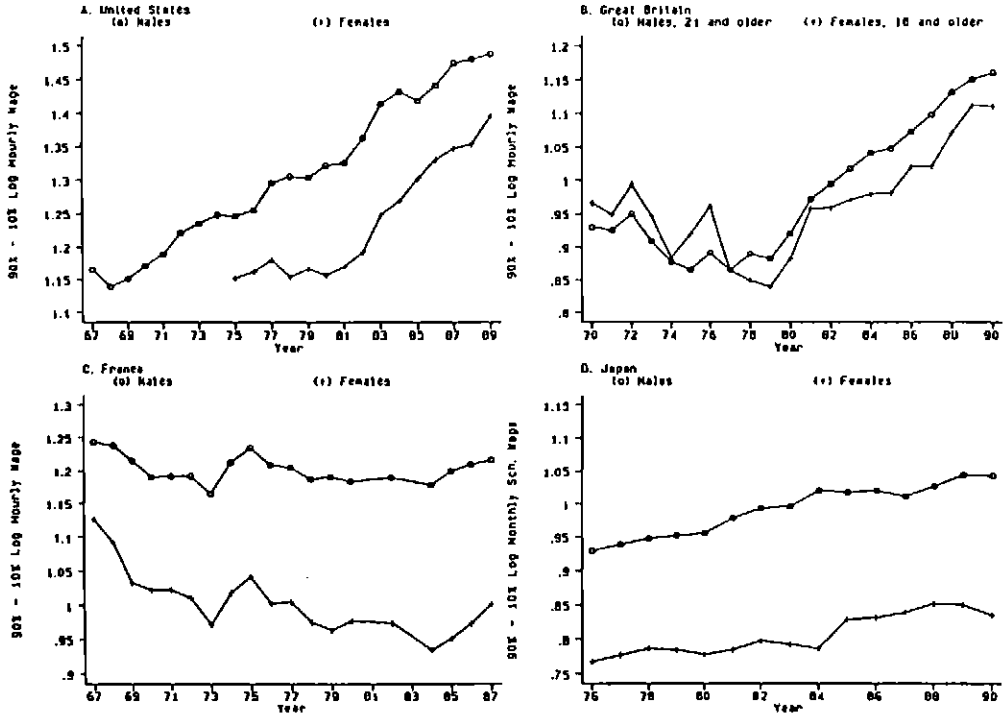

Figure 1: Changes in Overall Wage Inequality by Sex

by sex for full-time workers.[4] The figure plots the time-series of overall wage inequality for each group as measured by the log wage differential between the 90th and 10th 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 small increase in France starting in 1984. Panel A of Figure 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 1980s.[5] 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 1987. 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. But increases in inequality from 1984 to 1987 suggest that France may be experiencing relative demand shifts against the less-skilled similar to those in the United States. France's delayed and muted changes in wage structure may reflect labor market institutions that

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[4]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 Figure 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, 18-64 years old, using data from the Annual Demographic Supplements to the March Current Populations Surveys; (2) Britain: gross hourly earnings for full-time workers from the New Earnings Survey; (3) France: gross annual earnings adjusted for hours differences for full-time, full-year workers from Declarations Annuelles de Salaires; and (4) Japan: monthly scheduled earnings for regular workers from the Basic Survey on Wage Structure.

[5]We do not present estimates of the 90-10 differential for women prior to 1975. because of changes in 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.

make it difficult to expand skill differentials. A system of minimum wages and contract extensions in France means unions can have a large impact 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 the Japan's manufacturing employment share during the 1980s.

How did the changes in relative earnings documented in Figure 1 translate into changes in real earnings? Figure 2 tries to answer this question by the plotting cumulative log real wage growth of the 10th, 50th, and 90th 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 the similar widening of the 90-10 differential in the 1980s in Britain and the United States, but indicate that this widening implied a 10 percent real wage decline from 1979-89 at the 10th percentile in the U.S. wage distribution and a 10 percent real wage increase at the same point of the British distribution. 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 15 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 for males and has been substantially reduced for women in France.

III. 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.

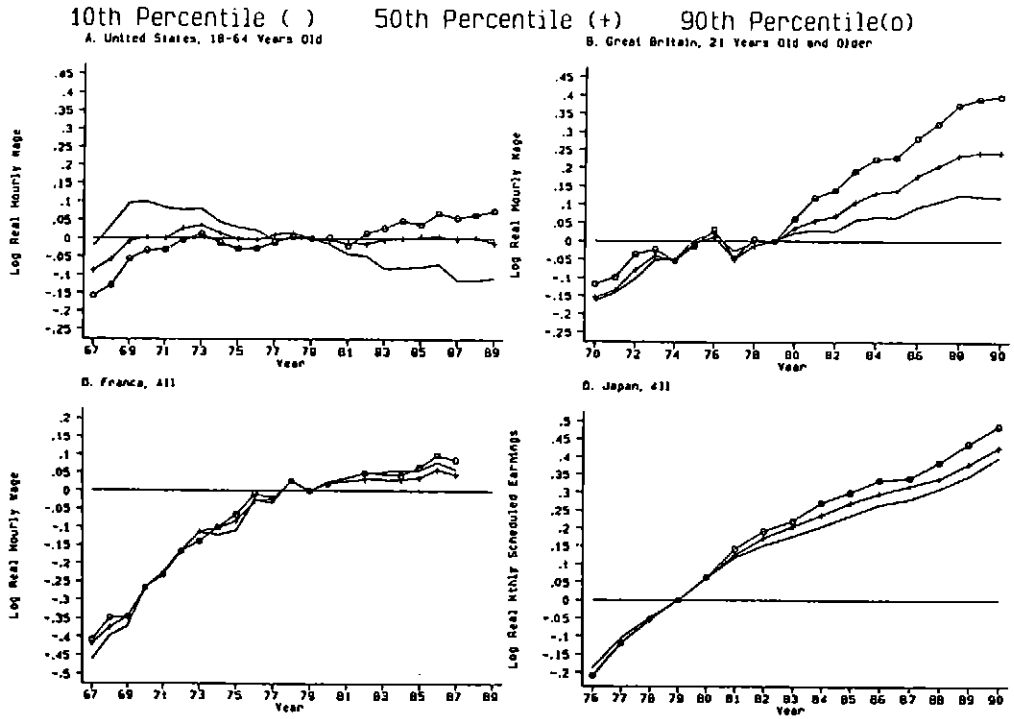

Figure 2: Cumulative Real Wage Growth By Decile, Males

A. Changes in the Structure of Wages in the United States

We examine U.S. wage structure changes over the 1967 to 1991 period. Figure 3 summarizes relative wage changes for the 1967 to 1989 period using data from all twenty-three Annual Demographic Supplements to the March Current Population Survey (CPS) for survey years 1968 to 1990. The wage measure is hourly earnings computed as annual earnings divided by annual hours (annual weeks worked times usual weekly hours). Table 1 provides information on real earnings levels and changes in real and relative earnings by sex-education-experience groups for the 1979 to 1991 period 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 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 that usually work 35 or more hours per week).

Panel A of Figure 3 documents movements in the college/high school log wage ratio for all males (those with 1 to 40 years of potential experience) and for new entrants (those with 1 to 5 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 40 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 1967-89 period.) 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 educational differentials were much larger for new entrants than for older workers in the 1970s and 1980s.

Sharp increases in education differentials for are further illustrated in Table 2. The table

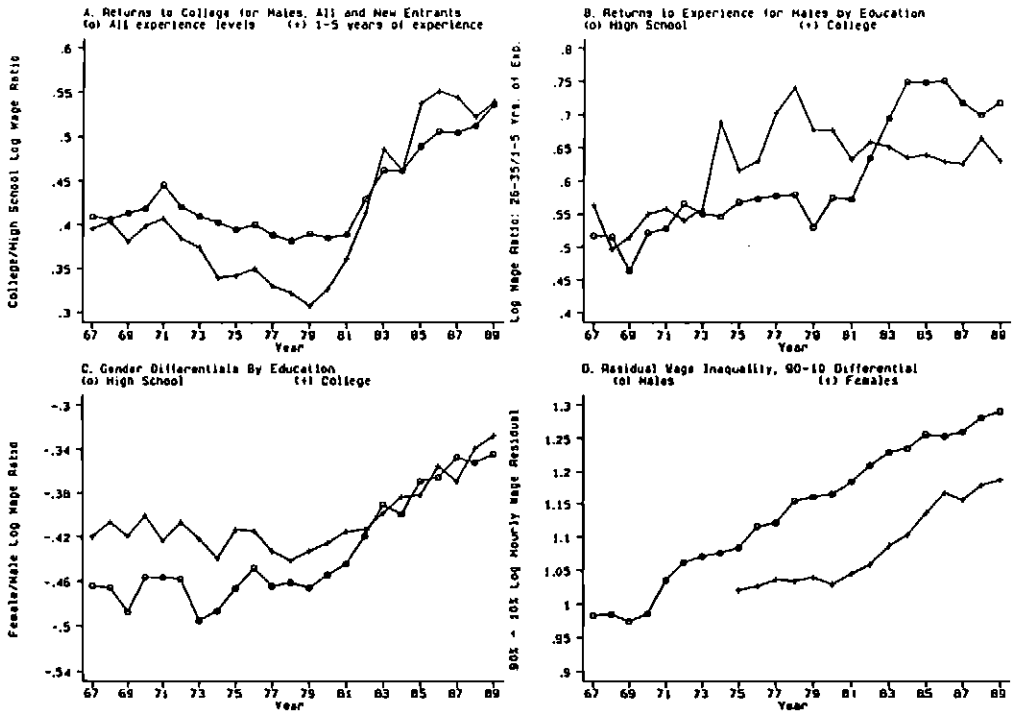

Figure 3: U.S. Relative Hourly Wage Changes, 1967-89

Table 1

Summary of Changes in 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	-0.294
		12	2.361	2.155	2.087	-0.274
		14	2.440	2.299	2.235	-0.205
		16	2.602	2.588	2.536	-0.066
	25	10	2.537	2.396	2.304	-0.233
		12	2.693	2.612	2.533	-0.160
		14	2.811	2.792	2.725	-0.086
		16	3.016	2.985	2.937	-0.079
Female	5	10	1.909	1.737	1.709	-0.200
		12	2.075	1.976	1.930	-0.146
		14	2.218	2.170	2.126	-0.092
		16	2.377	2.444	2.426	0.049
	25	10	2.051	1.964	1.938	-0.113
		12	2.197	2.219	2.191	-0.006
		14	2.331	2.437	2.422	0.092
		16	2.486	2.564	2.583	0.097

Notes: Each estimate is from a separate cross-section regression for full-time workers by sex and year of log real hourly earnings on 10 schooling dummies (for less than 8, 9, 10, 11, 13, 14, 15, 16, 17, and 18 or more years of schooling), a quartic in experience, interactions of all the experience terms with three broad education level dummies (less than 12, 13-15, and 16 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 for 1979, 1987, and 1991. The sample sizes in the regressions ranged from 45,140 to 69,415 observations.

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.[8] 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 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 1987 to 1991 period than in the 1979 to 1987 period.

Panel B of figure 3 compares movements in the log ratio of the earnings of peak earners (those with 26-35 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 they 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 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-

[8]Separate log hourly earnings regressions by sex for full-time workers were run in each year using data from the CPS ORG samples. Each regression included 10 schooling dummies (for less than 8, 9, 10, 11, 13, 14, 15, 16, 17, and 18 or more years of schooling), a quartic in experience, interactions of all the experience terms with three broad education level dummies (less than 12, 13-15, and 16 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.

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 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 wage log 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 regressions 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.

Panel D of figure 3 plots the time series of the difference in the 90th and 10th 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 1967 to 1989 period 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 rather smoothly increasing in the 1980s. This time pattern contrasts sharply with

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[7]The plots are of fixed-weighted averages of the female/male wage log ratios for 40 single year experience groups for both college and high school workers.

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 premia over the 1963-87 period are actually somewhat distinct economic phenomena. The earlier increase in within-group inequality suggests a rise in the demand for "skill" that predates the recent rise in returns to education.

B. 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).[8] 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 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 5 age groups for both males and females.[9] 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-weight nonmanual/manual differential increased over the 1979

[8]The New Earnings Survey is described in detail in UK Department of Employment (1991).

[9]The 5 age categories used are 21-24, 25-29, 30-39, 40-49, and 50-59 years of age. The fixed weights are the average share in total employment of each age-sex cell in the years 1974, 1979, 1984, and 1989.

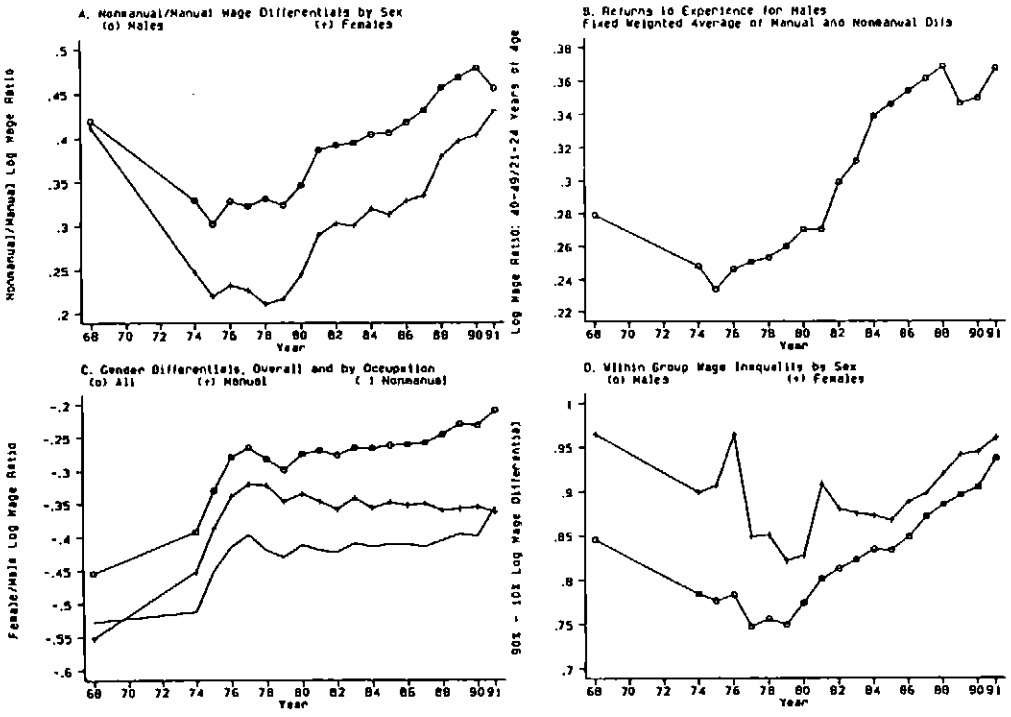

Figure 4: U.K. Relative Hourly Wage Changes, 1968-91

to 1991 period from 0.32 to 0.46 for males and from 0.22 to 0.43 for females.[10]

Panel B of Figure 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 10 age-occupation cells.[11] In fact, wage inequality increased greatly in the 1980s in Great Britain within both detailed occupations and within 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.[12] Table 2 uses the GHS data to examine the earnings of university graduates relative to individuals with no "educational qualifications" over the 1974 to 1990 period. All British children must attend full-time education until the age of 16, 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

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[10]See Adams, Maybury, and Smith (1988) for a detailed presentation of changes in wages by occupation for males in Great Britain from 1973 to 1986.

[11]The 10 cells for each sex involve the combination of five age groups (21-24, 25-29, 30-39, 40-49, and 59-59) and two broad occupational categories (manual and nonmanual).

[12]See Schmitt (1992) for a detailed discussion of earnings and education data in the GHS.

Table 2

Log Weekly Earnings Equations, Great Britain, 1974-1990

	1974-75	1978-79	1982-83	1988-90
1) 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	.4239	.4143	.3569	.3567
N	12542	12424	9010	8416
2) 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	5497	5615	4359	4876

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 11 month dummies, 10 region dummies, year dummies, 13 qualifications dummies including degree plus a race dummy. The numbers in parentheses are standard errors. The sample is restricted to full-time employees.

Source: General Household Surveys, 1974-90.

education in Britain. Tabulations for individuals aged 16 to 60 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 male and 31 percent of employed females had no qualifications.

The reported university degree differentials in Table 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 education qualifications dummies, ten region dummies, a race dummy, experience, experience squared, and month dummies.[13] The base education group is those with no qualifications. Thus Table 2 compares the earnings of those with university degrees to members of this no qualifications group with same number of years of labor market experience. Regressions are reported for pooled samples 1974-75, 1978-79, 1982-83, and 1988-90. The estimates indicate that the university earnings premium declined from the mid to 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 (1992) findings from the GHS for 1974-88.

C. 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. These wage data are compiled from wage surveys of non-government

[13]The samples for the regressions include full-time employees from 16 to 69 years old. Year dummies are included in all the regressions.

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 of the 10th, 50th, and 90th 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 10 regular worker) means 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.[14]

Figure 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.[15] 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 that entered the labor market at the same time. The college log wage premium for those of the same age fell moderately from by 0.07 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

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[14]We have also analyzed changes in wage differentials for men over the 1967-87 period 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.

[15]The age groups are 20-24, 25-29, 30-39, 40-49, and 50-59. The experience groups cover workers with approximately 1-2, 3-7, 8-12, 13-17, 18-22, 23-27, 28-32, and 33-37 years of potential experience. The fixed-weights are the average share of the each age (or experience) group in total male employment over the 1967-90 period.

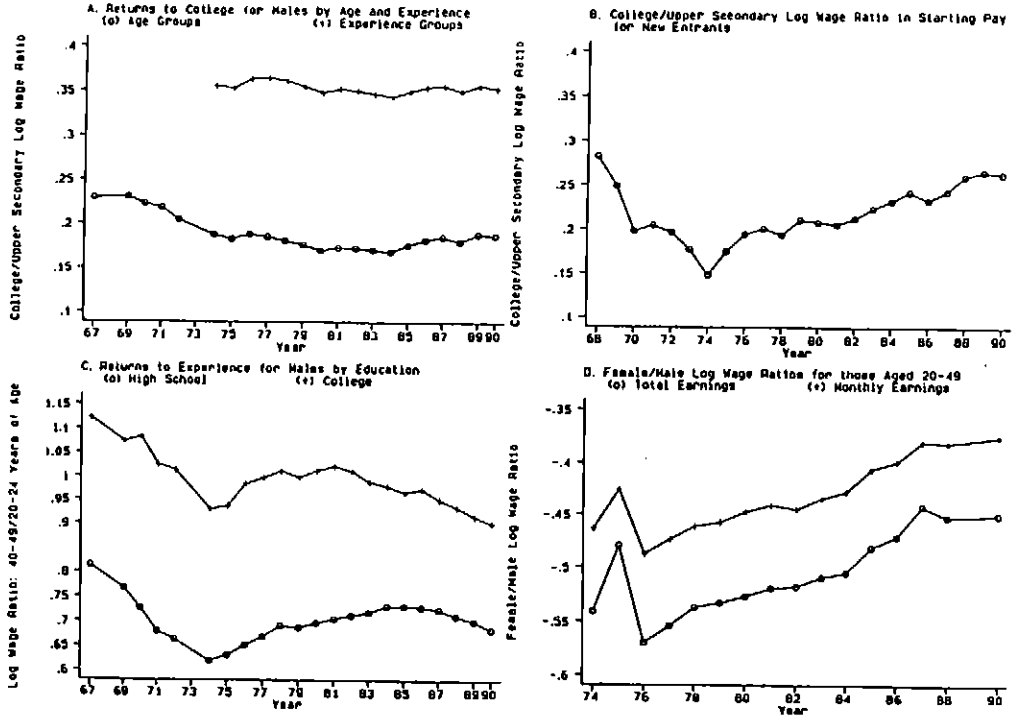

Figure 5: Japan, Wage Structure Changes, 1967-90

1990. But panel B of Figure 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 seen 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 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 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 20 to 49 years. The different patterns of educational attainment of men and women in Japan have led us to not 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 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 educational differentials for young workers is similar to the U.S. pattern. The reversal of a pattern of rising experience differentials to a pattern of shrinking experience differentials by the late 1980s is more extreme in Japan 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 we can compute for our

other countries.

D. 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 semi-public 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 1976-1987. No data collection took place in 1981 or 1983, so these years are missing from the time series. While detailed occupational data are available in the DAS, there was a significant occupational redefinition beginning in 1984 that makes detailed comparisons problematic. Aggregating occupations into nonmanual and manual categories eliminates nearly all of the incompatibilities.

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

Figure 6 summarizes between group changes in the French wage structure for the 1976-87 period and within-occupation changes for the 1967-87 period. 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 8 age groups for each sex.[16] 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

[16]The age groups are 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55, and 56-60. The fixed-weights are the average employment shares of each age group over the sample.

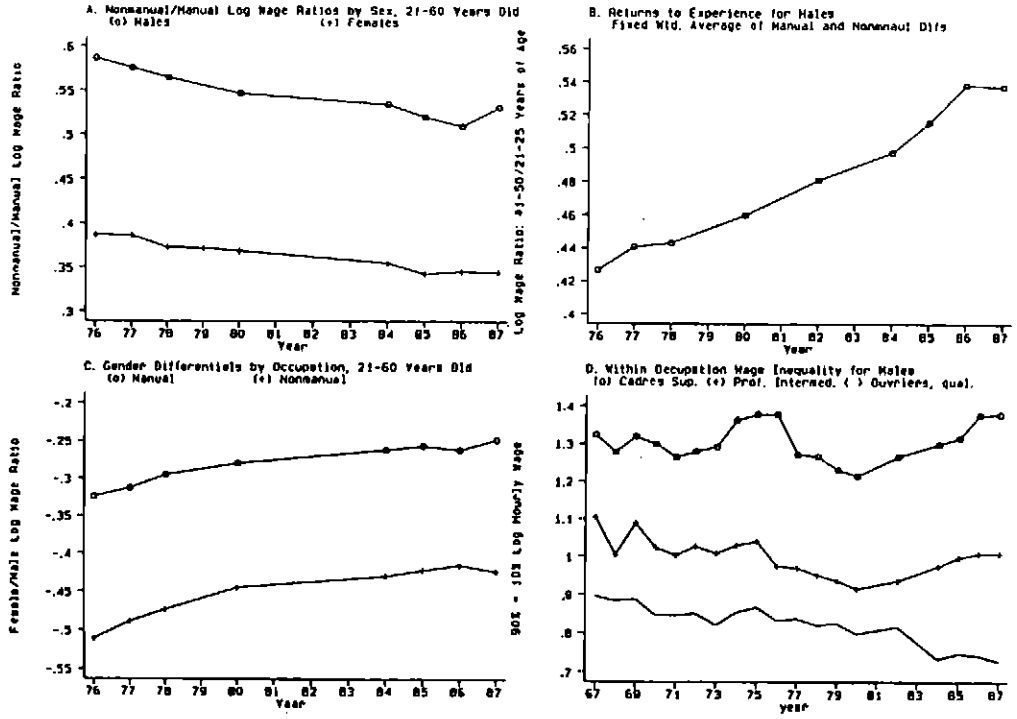

Figure 6: France, Major Changes in Wage Structure

panel B of figure 6 shows that the experience differentials for males in France increased in a quite similar fashion to the analogous measure for British males (shown in panel B of figure 4). Female/male log wage differentials by broad occupation (measured by fixed-weighted averages of the male/female 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).

E. 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 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 are largest in Britain and the United States.[17]

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

[17]Differences in education systems mean 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. Table A2 of the Appendix 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 occupational classification systems. Differences in the organization of work and similarities in educational 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 3
Wage Structure Changes in Four OECD Countries
The Scorecard

	1970s				1980s			
	U.S.	G.B.	France	Japan	U.S.	G.B.	France	Japan
Male								
Overall inequality	↑↑	↓↓	↓↓		↑↑	↑↑	↑	↑↑
Within inequality	↑↑	↓↓	↓↓		↑↑	↑↑	↔	
Education/Occupation	↓↓	↓↓	↓↓	↓↓	↑↑	↑↑	↔	↑
Experience								
College/Nonmanual	↑↑	↔		↑	↓	↑↑	↑↑	↓↓
≤ HS/Manual	↔	↔		↑	↑↑	↑↑	↑↑	↔
Female								
Overall inequality	↔	↓↓	↓↓		↑↑	↑↑	↑	↑↑
Within inequality	↑	↓↓	↓↓		↑↑	↑↑	↔	
Education/Occupation	↓↓	↓↓	↓↓		↑↑	↑↑	↔	
Female/Male	↔	↑↑	↑		↑↑	↑	↑↑	↑↑

Notes:

↑↑: increases by a substantial magnitude
↑: small increase
↔: no change
↓: small decrease
↓↓: large decrease
blank signifies insufficient information

with no rise in inequality through 1984. Increased wage inequality in France from 1984 to 1987 suggests wage structure changes similar to those experienced 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 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.

IV. 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 of 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.

A. 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 Murphy (1992) find that a simple hypothesis of this type does a good job 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 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

Table 4

Relative Supplies of College Educated Workers in Four Countries

Group, Ages	% with College Education			Annual Log Growth Rates	
U.S., Employees	1969	1979	1989	69-79	79-89
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
U.S., 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
G.B., Population	1973	1979	1989	73-79	79-89
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
G.B., 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
France, Population	1970	1980	1989	70-80	80-89
Males, 15+	5.3	8.3	11.8	.045	.039
Females, 15+	5.3	6.9	10.4	.026	.046
France, Labor Force	1968	1982	1987	68-82	82-87
Males, 15+	4.3	10.1	13.2	.061	.054
Males & Females, 15+	3.8	10.9	14.0	.075	.050
Japan, Regular Employees	1970	1979	1990	70-79	79-90
Males, All	11.1	18.9	25.1	.059	.026
Japan, All Employees	1971	1979	1987	71-79	79-87
Males, 15+	15.1	21.0	25.6	.041	.025
Males & Females, 15+	12.0	17.9	22.5	.050	.029

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 its particularly sharp acceleration in the pace of deindustrialization in the early 1980s.

Since educational earnings differentials expanded and gender earnings differentials 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 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 6 but are almost twice as large in magnitude.

In summary, simple supply and demand factors appear to go a reasonable difference towards 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- and within-industry demand shifts also appears in these two countries with massive increases in wage inequality in the 1980s. France's stable skill differentials may relate to a continuation of a rapid growth of the relative supply of highly-educated workers in the 1980s. Nevertheless, the much earlier appearance of rising inequality in the United States than the other three countries and the extent to which France's wage structure behaved differently than the others in the 1980s do suggest that differences in labor market institutions may play a major role in explaining differential responses of national wage structures to common relative skill demand shifts.

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 and non-college workers in the United States is in Freeman's (1986) preferred 1-3 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 figure 3) 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 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 remained the greatest in the 1980s. The evidence for a deceleration in log relative supply growth 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 versus the adult labor force).

8. 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 post-war 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 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 relative supply of college graduates is 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 finding that the share of employment of college graduates and women increased inside almost every two-digit industry in the United States from 1963-87 despite increases in the relative prices of college graduates and females suggests important shifts in relative demand have occurred within detailed industries (Katz and Murphy, 1992). These changes in relative demand for more-educated and nonproduction workers appear to have accelerated in the 1980s

(Berman, Bound, and Griliches, 1992). Similar changes in factor ratios within one-digit industries are apparent in our examination of British data from the Labour Force Survey for the 1980s. Thus an 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 plays some role in rising wage inequality in the 1980s.

The effects of between-industry shifts in labor demand on the relative demands for different skill and demographic groups depends 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 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 over-represented in agriculture, construction, mining, and many manufacturing sectors. College graduates are over-represented 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 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 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 industrial distribution of employment in each of the four countries also are likely to have favored women over men.

Table 5
Sectoral Employment Shares, 1965-89

	1965	1970	1975	1980	1985	1989
1) 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
2) GREAT 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
3) 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
4) 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, Labour Force Statistics.

We next attempt to more systematically determine 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

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

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

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

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 either be justified as a fixed-coefficients "manpower requirements" index (Freeman, 1986) or as an approximation 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.[18] 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 6 presents changes in our relative demand shift measures over the 1969-79 and 1979-89 periods for eight demographic groups in the United States and six demographic groups in Britain and Japan.[19] 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 are 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

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[18]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 indicate that estimated shifts in relative labor demands are not very sensitive to the choice of base year over the 1967 to 1989 period. The α_{ij}'s were calculated using data on employment status, industry, education, and sex from household surveys in each country: the CPS Outgoing Rotation Groups in the United States; the Labour Force Survey for Britain; and the Employment Status Survey for Japan.

[19]Unfortunately we do not have the necessary data to calculate analogous measures for France.

Table 6
Industry Based Demand Shift Measures, 1969-1989

	Change in log relative demand			
	Males		Females	
Education Group	69-79	79-89	69-79	79-89
1) UNITED STATES				
Drop Outs	-.044	-.048	-.003	-.009
High School Graduates	-.036	-.041	.023	.025
Some College	-.011	-.012	.046	.047
College Graduates	.016	.019	.057	.054
2) GREAT BRITAIN				
No qualifications	-.072	-.097	.028	.000
A-levels, O-levels etc.	-.039	-.041	.069	.084
College	.026	.059	.102	.119
3) 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 $e_{jt} = \Sigma_i \alpha_{ij} e_{it}$, 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 9 one-digit industries for the United States and Japan and 8 one-digit industries for Britain.

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 its particularly sharp acceleration in the pace of deindustrialization in the early 1980s.

Since educational earnings differentials expanded and gender earnings differentials 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 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 6 but are almost twice as large in magnitude.

In summary, simple supply and demand factors appear to go a reasonable difference towards 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- and within-industry demand shifts also appears in these two countries with massive increases in wage inequality in the 1980s. France's stable skill differentials may relate to a continuation of a rapid growth of the relative supply of highly-educated workers in the 1980s. Nevertheless, the much earlier appearance of rising inequality in the United States than the other three countries and the extent to which France's wage structure behaved differently than the others in the 1980s do suggest that differences in labor market institutions may play a major role in explaining differential responses of national wage structures to common relative skill demand shifts.

V. 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 occupational 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 inter-related 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 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 based on 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 that 60 percent from 1976 to 1987 (Bridgford, 1990).

The membership figures, however, do not accurately portray union influence. Support for the unions is better measured by their candidates' success in elections for positions on industrial tribunals and enterprise committees.[20] While the percentage of votes cast for union candidates has declined since the 1970s, Bridgford (1990) reports that they still receive nearly fifty percent of the votes for industrial tribunals and nearly eighty 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, so that unions exert significant influence on the terms and conditions of employment throughout most industries. Data from 1981 show that nearly eighty percent of all firms, and nearly ninety 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.[21]

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

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

[21]Hence, large firms typically cannot significantly reduce labor costs by sub-contracting to small producers.

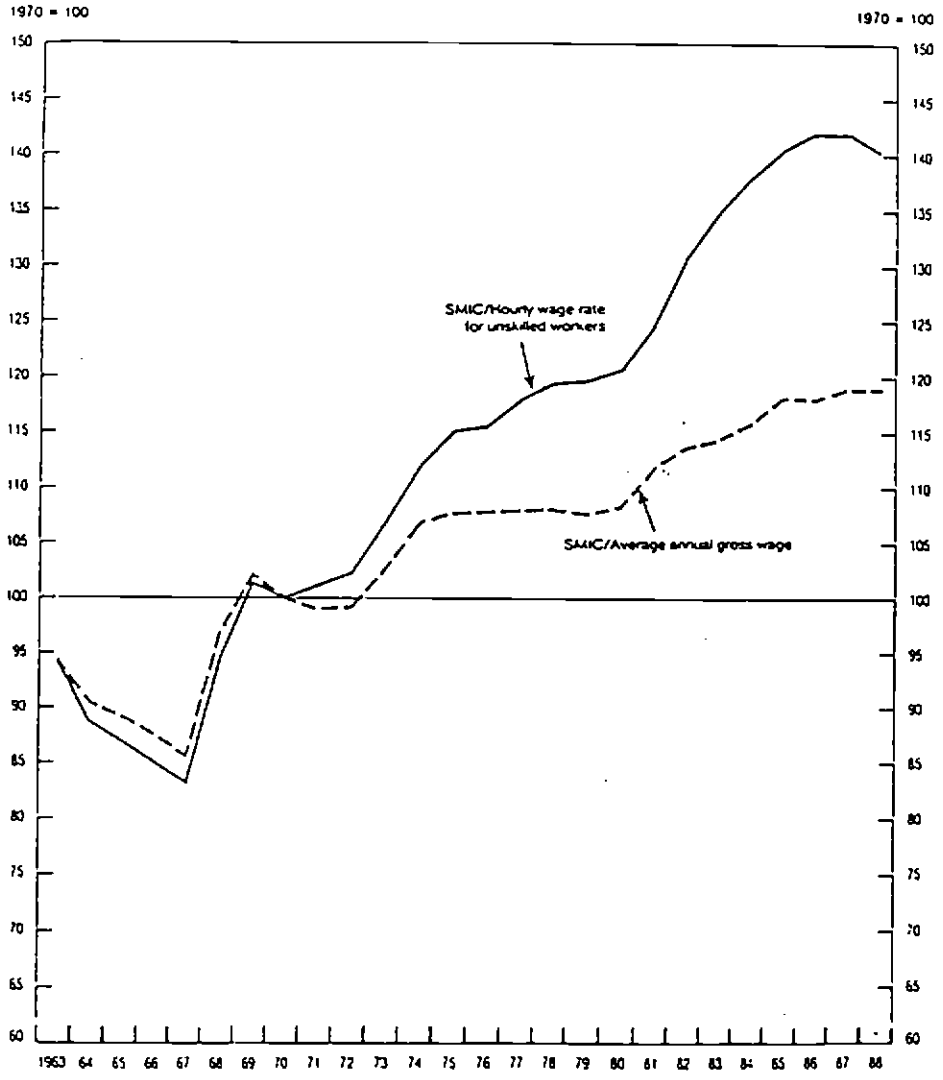
Federal minimum wage of ($3.35 per hour) or less in 1988, and this fraction had declined significantly since 1981 (Haugen and Mellor, 1990). The SMIC has been at least 60% of the mean wage since 1978, and has actually increased significantly since then in terms of the mean wage (Katz and Loveman, 1990). Figure 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 1980s 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. We estimate using our data on French earnings distributions from the DAS 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 10th 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 1979 to 1987 period 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 metal working, it is set as a multiple of the SMIC. In either case, changes in the

Figure 7.

EVOLUTION OF STATUTORY MINIMUM WAGES[1]



1 SMIC: Salaire Minimum Interprofessionnel de Croissance.
Source: OECD *Main Economic Indicators and National Accounts.*

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 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 50th and 10th percentiles) is much more compressed relative to the top half (as measured by the log wage gap between the 90th and 50th percentiles) than in the other three countries. The 50-10 differential narrowed a bit for both French men and women 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.[22] While one must be cautious in drawing conclusions concerning the effects of the SMIC on the employment of youth 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 may have been a slight 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,

[22]See OECD (1985).

Table 7
Alternative Measures of Wage Inequality for Four Countries, 1979-1990

	1979	1984	1987	1990
a) MALES				
90/10				
US	1.23	1.36	1.38	1.40
GB	0.88	1.04	1.10	1.16
France	1.19	1.18	1.22	
Japan	0.95	1.02	1.01	1.04
90/50				
US	0.56	0.66	0.68	0.69
GB	0.51	0.61	0.63	0.67
France	0.72	0.73	0.76	
Japan	0.49	0.52	0.51	0.55
50/10				
US	0.67	0.70	0.69	0.71
GB	0.37	0.43	0.47	0.49
France	0.47	0.45	0.46	
Japan	0.47	0.50	0.50	0.50
b) FEMALES				
90/10				
US	0.96	1.16	1.23	1.27
GB	0.84	0.98	1.02	1.11
France	0.96	0.93	1.00	
Japan	0.78	0.79	0.84	0.83
90/50				
US	0.55	0.63	0.61	0.67
GB	0.50	0.58	0.59	0.64
France	0.53	0.52	0.54	
Japan	0.43	0.45	0.50	0.49
50/10				
US	0.41	0.53	0.63	0.61
GB	0.34	0.41	0.43	0.47
France	0.44	0.41	0.46	
Japan	0.35	0.34	0.34	0.35

Notes: 90/10 refers to the log wage differential between the 90th and 10th percentile workers. The 90/50 and 50/10 differentials are defined analogously. The wage inequality measures refer to log hourly wages for the U.S., Great Britain and France, and to log monthly scheduled wages for Japan.

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.

VI. 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-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.

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Data Appendix

UNITED STATES

Data Source I: 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, 18-64 years old. The wage sample excludes those in the military, students, agricultural workers, without-pay workers, those that worked less than 13 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 military, students, agricultural workers, and without-pay workers.

Remarks: Adjustments for top coding, bracketed weeks and hours variables, 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 7.

Data Source II: Outgoing Rotation Groups, 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, 18-64 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 $100.00 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 I: New Earnings Survey (NES), published volumes for 196B and 1970-91.

Earnings Concept: Gross hourly earnings.

Wage Sample: Full-time employees, 21 or older for males and 18 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 one-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 II: General Household Survey (GHS), 1973-90.

Earnings Concept: Gross weekly earnings.

Wage Sample: Full-time employees, 16-69 years old.

Remark: A CPS-style household survey of 10 to 15 thousand households per year.

Data Source III: Labour Force Surveys (LFS), 1979-1990.

Earnings Concept: No earnings information is collected.

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

JAPAN

Data Source I: Basic Survey on Wage Structure, published tabulations, 1967-90.

Earnings Concept: Monthly scheduled earnings.

Wage Sample: Regular workers, 18-59 years old, at non-governmental establishments with at least 5-10 regular workers (varies by survey year). Excludes agriculture, forestry and fisheries, private household services and employees of foreign governments.

Remarks: 70,000 to 100,000 establishments are surveyed in a typical year. The sample excluded the service sector prior to 1973.

Data Source II: Employment Status Survey, published tabulations, 1971-1987.

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

Remark: 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).

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

Wage Sample: Full-time, full-year workers in private and semi-public firms.

Table A1
Comparative Overview: U.S., Great Britain, France and Japan
(annual growth rates from preceding to current period)

	1965	1970	1975	1980	1985	1989
1) UNITED STATES						
Real GNP (1965=1)	1	1.16 (3.0)	1.30 (2.3)	1.53 (3.3)	1.72 (2.3)	1.94 (3.0)
Population, 15-64 years (millions)	116.6	127.0 (1.7)	138.9 (1.8)	150.8 (1.6)	158.8 (1.0)	163.9 (0.8)
Civilian Empt. (millions)	71.1	78.7 (1.9)	85.6 (1.7)	99.3 (3.0)	101.2 (1.5)	117.3 (2.3)
Civilian labor force (millions)	74.5	82.8 (2.1)	93.7 (2.5)	106.9 (2.6)	115.5 (1.5)	123.9 (1.8)
Unemployment rate - all	4.4	4.8	8.3	7.0	7.1	5.2
Unemp. rate, 16-24 years	9.1	9.9	15.2	13.3	13.0	10.5
2) GREAT BRITAIN						
Real GNP (1965=1)	1	1.13 (2.4)	1.27 (2.3)	1.37 (1.5)	1.49 (1.7)	1.73 (3.7)
Population, 15-64 years (millions)	35.0	35.0 (0.0)	35.2 (0.1)	36.1 (0.5)	37.2 (0.6)	37.5 (0.2)
Civilian Empt. (millions)	24.8	24.4 (-0.3)	24.7 (0.2)	25.0 (0.2)	24.2 (-0.7)	26.0 (1.8)
Civilian labor force (millions)	25.1	24.9 (-0.1)	25.6 (0.6)	26.5 (0.7)	27.5 (0.7)	27.8 (0.3)
Unemployment rate - all	1.2	2.2	3.9	6.5	12.4	6.3
Unemp. rte, 16-24 years	-	2.8	8.7	13.5	21.8	n/a

Table A1: continued

	1965	1970	1975	1980	1985	1989
3) JAPAN						
Real GDP (1965=1)	1	1.79 (11.6)	2.27 (4.8)	2.95 (5.2)	3.56 (3.8)	4.24 (4.4)
Population, 15-64 years (millions)	66.6	71.6 (1.4)	75.6 (1.1)	78.7 (0.8)	82.3 (0.9)	85.5 (1.0)
Civilian Empt. (millions)	47.3	50.9 (1.5)	52.2 (0.5)	55.4 (1.2)	58.1 (1.0)	61.3 (1.3)
Civilian labor force (millions)	47.9	51.5 (1.4)	53.2 (0.6)	56.5 (1.2)	59.6 (1.1)	62.7 (1.3)
Unemployment rate - all	0.9	1.1	1.9	2.0	2.6	2.2
Unemp. rate, 15-24yrs	1.3	2.0	3.0	3.6	4.8	4.5
4) FRANCE						
Real GDP (1965=1)	1	1.30 (5.2)	1.58 (3.9)	1.86 (3.3)	1.97 (1.1)	2.24 (3.2)
Population, 15-64 years (millions)	30.4	31.6 (0.8)	33.0 (0.9)	34.3 (0.8)	36.3 (1.1)	37.0 (0.5)
Civilian Empt. (millions)	19.5	20.3 (0.9)	20.9 (0.6)	21.3 (0.4)	20.9 (-0.4)	21.5 (0.7)
Civilian labor force (millions)	19.8	20.9 (1.0)	21.7 (0.9)	22.8 (0.9)	23.4 (0.5)	23.8 (0.4)
Unemployment rate - all	1.5	1.8	3.8	6.0	10.1	9.5
Unemp. rate 15-24 years	-	3.2	7.9	15.0	25.6	19.1

Sources: OECD, Labour Force Statistics; and OECD, Quarterly National Accounts.

Table A2
Nonmanual/Manaul Log Wage Differentials in Three Countries

		Log non-manual / manual wage ratio			
Sex	Age	1978	1984	1987	1991
United States					
Male	21-24	0.143	0.268	0.298	0.352
	25-29	0.225	0.344	0.380	0.391
	30-39	0.288	0.380	0.430	0.440
	40-49	0.305	0.392	0.428	0.496
	50-59	0.344	0.365	0.416	0.473
Female	21-24	0.019	0.148	0.194	0.206
	25-29	0.101	0.198	0.261	0.320
	30-39	0.266	0.318	0.354	0.411
	40-49	0.347	0.419	0.449	0.492
	50-59	0.385	0.426	0.467	0.545
Great Britain					
Male	21-24	0.063	0.116	0.155	0.222
	25-29	0.247	0.290	0.341	0.402
	30-39	0.400	0.454	0.503	0.562
	40-49	0.464	0.536	0.581	0.647
	50-59	0.457	0.533	0.576	0.610
Female	21-24	0.139	0.225	0.215	0.305
	25-29	0.295	0.357	0.377	0.461
	30-39	0.301	0.435	0.460	0.578
	40-49	0.305	0.395	0.396	0.531
	50-59	0.296	0.401	0.430	0.513
France					
Male	21-25	0.153	0.159	0.146	
	26-30	0.343	0.327	0.344	
	31-35	0.529	0.446	0.457	
	36-40	0.666	0.598	0.563	
	41-45	0.705	0.690	0.690	
	46-50	0.746	0.702	0.714	
	51-55	0.776	0.726	0.717	
	56-60	0.789	0.854	0.841	
Female	21-25	0.224	0.215	0.194	
	26-30	0.315	0.302	0.294	
	31-35	0.379	0.346	0.325	
	36-40	0.413	0.401	0.368	
	41-45	0.420	0.423	0.424	
	46-50	0.430	0.398	0.411	
	51-55	0.449	0.410	0.403	
	56-60	0.451	0.434	0.443	

Note: The reported numbers are the logs of the ratio of the mean hourly wages of full-time nonmanual 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.