

# **Rising Wage Inequality**

## **The 1980s Experience in Urban Labor Markets**

Copyright©2000 W.E. Upjohn Institute for Employment Research

### **Chapter 1 - Introduction**

Thomas Hyclak, *Lehigh University*

One of the most significant labor market developments in the last decade and a half has been the sharp rise in wage inequality in the United States, the United Kingdom, and many other countries. For example, Karoly (1988) estimated the variance in the logarithm of annual earnings for white males working at least 35 hours a week and 50 weeks a year at 0.282 in 1969, 0.264 in 1979, and 0.376 in 1987. The 42 percent increase from 1979 to 1987 brought that measure of wage inequality to levels unseen in the United States since the 1930s (Goldin and Margo 1992).

A change of such magnitude has not escaped the attention of economists, particularly given the social and political consequences of rising wage inequality. A substantial body of literature on the subject, with contributions by almost every prominent labor economist, has emerged over the past decade. That literature, reviewed briefly in the next section, has sharpened our understanding of many dimensions of the changing wage structure in the United States and other countries.<sup>1</sup> However, there are still many questions about the causes of the abrupt change in wage inequality during the 1980s. For example, debate continues about the relative importance of institutional factors (like the decline in union contract coverage) and market forces (like technological change and increased international competition) in accounting for changes in the wage structure.

This study takes a substantially different perspective on the problem from that prevailing in the literature. It differs in three ways. First, it focuses on changes in the wage structure in a sample of local labor markets. Although the relevant labor market is local for most workers (at least in the short run) and although during the 1980s there were marked regional differences in economic performance, most earlier studies have looked at the national labor market.

Second, it examines changes in the structure of wages paid for specific jobs. Most studies have used micro data from the Current Population Survey (CPS), which records the wages and salaries reported by individual workers. In the CPS data, however, it is difficult to separate the wage effects of labor-supply decisions about the hours of work, or multiple job-holding, or the wage effects of overtime pay, bonuses, and other wage supplements, from the wage paid for an hour of labor. This study uses data drawn from the Area Wage Surveys, which

reported the distribution of wages paid by establishments for a number of job titles in a local labor market.

Third, it focuses on jobs and the skills required as the primary determinant of wages. The approach complements the more traditional human capital wage model, which emphasizes the personal characteristics of workers (Groschen 1996). One important aspect of the rise in wage inequality appears to be a coincident rise in the wage advantage accruing to highly skilled workers. Focusing on jobs allows us to examine the rise in the wage advantage by using data on several required skills that are more related to job performance than are schooling and potential experience, the two variables at the heart of the human capital approach.

By studying changes in the distribution of wages for specific jobs in a sample of local labor markets, we may find answers to the following questions:

1. Are trends in the structure of wages in local labor markets similar to the trends in the structure of wages revealed in nationwide studies?
2. Do local labor markets differ in the extent and pattern of the rise in wage inequality?
3. Have changes in the availability of benefits accompanied changes in wage structure?
4. How have the wage returns on skills changed?
5. What is the relative importance of changes in union contract coverage and in the minimum wage in explaining changes in the wage structure?

## **WHAT DO WE KNOW?**

The following brief summary of the literature on the rise in wage inequality during the 1980s seeks not to offer critiques, but rather to catalogue what is known about the rise in wage inequality and to identify issues that need further attention. A convenient starting point is the careful review of the literature by Levy and Murnane (1992).

Levy and Murnane identified several points about the rise in wage inequality during the 1980s. Among the more significant of these are the following:

1. For both men and women, the rise in wage inequality appears to have been driven largely by variation in wages, not by variation in hours worked.

2. The rise in wage inequality, coupled with stagnant growth in real median wages, has resulted in a “hollowing out” of the middle range of the wage distribution.
3. Wage inequality between age groups and between groups with different levels of education was stable in the 1970s and rose sharply in the 1980s.
4. Wage inequality among workers of the same age and sex and with the same education has risen steadily since 1970.
5. Despite the considerable attention paid to de-industrialization, shifts of workers across industries and across occupations account for only a small portion of the rise in wage inequality during the 1980s.

In accounting for the rise in wage inequality overall, Levy and Murnane emphasized the importance of increases in inequality between and within groups stratified by skill level. Their analysis of wage inequality between groups points to a sharp rise in the wage advantage of more-educated, more-experienced, and generally more-skilled workers as the primary cause of greater inequality between groups. In turn, they traced the rise in skill advantage to a steady rise in the demand for skilled workers, perhaps due to technological change. Additionally, there is the hypothesis that greater international competition during the 1980s eroded the demand for less-skilled workers, even as increased immigration added to the supply. Levy and Murnane concluded that such supply-and-demand explanations of rising wage differences were generally consistent with much of the data available at the time of their review.

In their review of the literature on the causes of wage inequality within a group, however, Levy and Murnane found less convincing evidence in support of any one theory. While some researchers point to increasing returns on unmeasured skills in conjunction with rising returns on schooling as a possible explanation for rising wage inequality within a group, attempts to add extra skill measures to the basic human capital model did not strengthen the model’s power. The evidence on widening plant-level wage differentials looks like a more promising avenue to explore. However, Levy and Murnane concluded their review by listing the growth of inequality within a group as an important piece of the puzzle.

A number of studies have been published since Levy and Murnane’s review. The sections that follow summarize the contributions of those studies.

### **Returns on Skills**

Almost all studies of changes in the relative wages of workers with

different levels of education or experience find evidence of increases in the wage returns on higher labor market skills (for example, Buchinsky 1994; Card and Lemieux 1996). Differences in the returns on education have been found to play a big role in explaining international differences in the trend toward greater wage inequality (Gottschalk and Smeeding 1997). Wage inequality increased more in the United States and the United Kingdom than in Holland during the 1980s. In the United States and United Kingdom, a rising demand for workers with more education outstripped increases in the supply and drove up the relative wage for college-educated workers. In Holland, however, the supply of college-educated workers rose more rapidly than did the demand, and the college wage advantage in that country fell during the 1980s. These different patterns of change in the market for college-educated workers were significantly related to differences in trends in wage inequality for the three countries.

### **Additional Skill Variables**

One problem with many studies of the returns on skill is that skill is measured solely by education and potential labor market experience. It's clear that the range of potentially relevant skills goes well beyond those two characteristics. This has led some labor economists to examine the wage effect of additional measures of skill to see whether evidence exists for a general increase in returns on skill and to identify worker traits that might help explain why wage inequality has risen for those with a given level of education.

Grogger and Eide (1995) examined the role of skills acquired prior to entering college and the role of the specific skills associated with various college majors to see the effects of each on the relative earnings of workers with different levels of college education. Skills learned prior to college were measured by high school grades and by performance on standardized tests. Data were taken from the National Longitudinal Study of the high School Class of 1972 and from the High School and Beyond Survey of high school graduates in 1980. Grogger and Eide found that mathematics ability, as measured by standardized test scores, prior to college entry, had a statistically significant effect on workers' earnings, especially for women, and that the inclusion of that measure substantially eliminated any signs of an increased return on further education for women, but not for men, in the two high school classes. They also found that changes in the distribution of men across college majors during the 1980s tended toward highly skilled fields of study and helped to account for about 25 percent of the men's higher returns on additional years of college in the 1980 cohort.

Murnane, Willett, and Levy (1995) used the same data as Grogger and Eide to examine the effect of mathematics ability on workers's wages six years after high school graduation. An individual's score on the standardized

mathematics test had a statistically significant positive relationship with wages. A comparison of the classes of 1972 and 1980 showed higher returns on schooling and mathematics skill for men. For women, however, only the wage return on mathematics skill was higher for the class of 1980. Both classes had similar estimated wage returns on schooling. These two studies suggest that estimates of a rising college wage advantage may partially reflect changes over time in the composition of college students, by math ability and by major.

Constantine and Neumark (1996), added data on job training to a basic human capital model estimated separately for 1983 and 1991 CPS samples. As expected, more training was positively related to higher wages. However, they reported no evidence that the wage returns on training were higher in 1991 than in 1983, and the inclusion of training variables in the model had little impact on the finding that the estimated wage returns on schooling were higher in the 1991 sample.

The results of the three studies suggest that changes in the returns on skills are more complex than suggested by the estimates of the returns on schooling and potential experience found in the basic human capital model.<sup>2</sup> Individual cognitive skills, the skill content of the schooling chosen, and the amount of training received are all important determinants of the wage distribution. The results of the three studies also seem to confirm Levy and Murnane's conclusion that the skill measures generally available in data sets like the CPS are too broad to adequately test hypotheses about the rising demand for skilled workers during the 1980s.

### **Wage Instability**

A difficulty with basing inferences about the wage structure on what workers report in earnings surveys such as the CPS is that changes in the earnings distribution can reflect changes in the economic situation of individual workers as well as changes in the wages for a given set of jobs. The severity of the recessions of the early 1980s and the prevalence of "downsizing," even during the economic recoveries of the late 1980s and 1990s, suggests that increased worker turnover and job turnover in a turbulent labor market might be an important factor contributing to increases in measured wage inequality.

Studies by Gottschalk and Moffitt (1994) and Gittleman and Joyce (1996) examined changes in the variance in wages over time in matched samples of workers. They decomposed the variance into permanent and transitory components, where the permanent component (the variance of individual earnings averaged over a number of years) is meant to capture changes in the wage structure. Both studies found that the increase in wage inequality during the 1980s reflected roughly equal increases in the variances of both the permanent and the

transitory components of wages. In addition, Haveman and Buron (1994) concluded that changes in the utilization of earnings capacity may have played a more important role in accounting for increased wage inequality than is commonly thought. This suggests that special care must be taken to separate the sources of transitory wage instability from factors associated with fundamental changes in the wage distribution.

## **International Trade**

Because the rise in wage inequality in the 1980s coincided with a period of sharp increases in the U.S. trade deficit, it is tempting to probe for links between the two. The examination of the effects of trade on the domestic wage distribution has generated considerable interest and debate. In part this reflects the anti-free-trade position of many who blame imports for deindustrialization and the hollowing out of the U.S. wage distribution.

Wood (1995) has been a strong proponent of the view that the opening of trade with less-developed countries during the 1980s had a large effect on the relative wage of skilled versus unskilled workers. Trade with less developed countries is seen as effectively raising the supply of less-skilled laborers in developed countries and as lowering their relative wage. Wood's factor-content analyses of trade generated support for that hypothesis. Several other studies have examined the impact of trade on the wage differential favoring the skilled.

For example, Borjas and Ramey (1995) identified a positive co-integrating relationship between the college/high school wage differential and the durable-goods trade deficit during the 1980s. By way of contrast, they did not find evidence that the college wage advantage was co-integrated with changes in the labor supply, unionization, research and development spending, or the nondurable goods trade deficit. Buckberg and Thomas (1996) also used the co-integration approach to find statistical evidence for a common movement over time in the college/high school wage differential and in changes in employment in durable goods manufacturing. They argued that changes in the number of jobs in that sector during the 1980s were highly sensitive to foreign trade.<sup>3</sup> Feenstra and Hanson (1996) found that both outsourcing (which they defined as the purchase of imported intermediate products) and import competition in final-goods markets are important in explaining changes in the wages of nonproduction workers relative to those of production workers across manufacturing industries between 1979 and 1990.<sup>4</sup>

Two other studies on the effects of trade relied on regional data for panel estimates of the effect on wage inequality. Borjas and Ramey (1995) found that the fraction of local employment in trade-affected concentrated industries was

positively related to the college/high school wage differential in a sample of over 40 metropolitan areas in 1976 and 1990. They also calculated that the drop in employment in the subject industries during the period can explain as much as 14 percent of the rise in the college wage differential observed in their sample. Karoly and Klerman (1994) estimated the effect of durable goods imports relative to GNP in a model explaining the variance of the logarithm of real wages in a sample of 20 state and multistate regions from 1973 to 1988.<sup>5</sup> Their results, which controlled for unemployment, unionization, industry structure, age distribution, and regional fixed effects, showed that the import ratio had an important positive relationship with the variance of wages.

However, Karoly and Klerman worried that the correlation might be spurious because their trade measure varied over time and the wage variance itself had a negative trend. Indeed, the problem of basing inferences of causality on the strongly trended time-series data led Sachs and Shatz (1996, 9. 239) to conclude, “There is still no convincing quantitative account of the role of trade in the widening wage inequality, though theory and circumstantial evidence certainly support the linkage of trade and widening inequalities.”

The main argument against international trade as a major determinant of rising wage inequality is that the percentage of U.S. employment accounted for by trade-affected manufacturing industries is too small to matter for the economy-wide changes in the wage structure during the 1980s (Burtless 1995). Topel (1997) pointed out that because the drop in the relative wage of unskilled workers has not been accompanied by a greater quantity demanded for them, factors other than a trade-induced increase in the supply of unskilled labor must be at work. Borjas, Freeman, and Katz (1997) undertook a careful analysis of the potential impact of both immigration and international trade on the relative earnings differentials associated with differences in education. They found that trade with developed countries has had no effect on the relative supply of unskilled workers and the supply effect of trade with less-developed countries is quite modest, even given different assumptions about the domestic adjustment to trade. Neither trade nor immigration seems to explain much about the rise in the college wage advantage after 1980. Immigration did appear to be significant in explaining the precipitous drop in the relative earnings of high school dropouts during the 1980s.

A final piece of evidence on the impact of trade on the U.S. wage structure can be gleaned by comparing changes in wages in developed and less-developed countries. If comparative advantage is related to endowments of skilled and unskilled labor, factor-price equalization should work to raise the relative wages of less-skilled workers in less-developed countries while lowering those wages in developed countries. Interestingly, an examination of labor market developments in the United States, Canada, and Mexico after signing of the North American Free

Trade Agreement (NAFTA) reveals few differences. In particular, wage inequality trends in Mexico appear to have paralleled those in the United States. The Commission for Labor Cooperation (1997) reported the following Gini coefficients for the post-tax and post-transfer distribution of household income in Mexico: 0.43 in 1984, 0.47 in 1989, and 0.48 in 1994. Comparable figures for the United States are 0.40 in 1984, 0.42 in 1989, and 0.43 in 1994. The similarities add weight to Topel's (1997) contention that factor-price equalization has not been an important feature of recent wage structure changes in developed countries.

### **Technological Change**

Some researchers have argued that we have only circumstantial evidence and theoretical support for arguing that technological change affects the wage distribution (Bound 1996). The issue is compounded by the difficulty of measuring technological change<sup>6</sup> and by the case-study evidence that new technology often results in the de-skilling of the workforce (Head 1996). Many economists, however, believe that technological change is the most logical explanation for the rise over time in both the wage advantage for workers with more education and skills and the relative use of skilled workers by U.S. businesses.

Some direct evidence on the issue comes from studies by Berman, Bound, and Griliches (1994) and by Machin, Ryan, and Van Reenan (1996) on the determinants of changes in the relative wages of nonproduction workers across manufacturing industries in the United States and the United Kingdom. Both studies reported that this gross measure of change in the skill differential was closely correlated with technological change (as measured by changes in capital, research and development, and computer intensity) across manufacturing industries and over time.

Krueger (1993) provided evidence on the wage effect of computer use on the job. He found that workers who used computers at work enjoyed wage levels in 1984 that were 18.5 percent higher than would have been predicted by a human capital model. Krueger also found that the wage advantage associated with computer use rose to 20.6 percent by 1989. Added evidence for a positive relationship between computer use and the demand for more highly skilled workers came from Autor, Katz, and Krueger (1997). Because much of the increase in technology during the 1980s can be associated with the acquisition of new computers and software by business firms, these results are taken as evidence that technological change has added to the demand for workers whose skills are suited to using the new technologies.

Other studies, however, question the importance of technological change in

explaining the rise in wage inequality in the 1980s. Mishel and Bernstein (1996) examined the relationship between the skills demanded and the technology used across industries and compared the 1980s with the 1970s. They measured the mix of skills by the share of industry workers in fixed wage ranges and measured technological change by the computers and other equipment per worker and the share of scientists and engineers in the industry's workforce. Mishel and Bernstein found that the pace of technological change slowed during the 1980s and that, relative to the 1970s, technological change appeared to be less adverse for the bottom half of the wage distribution and less favorable for the highest-paid quartile in the 1980s. They also found that the employment share of workers in the quartile just above the median fell during the 1980s in the industries with the most rapid technological change.

Along with the argument that the timing of the most rapid technological change was incongruent with that of the fastest rise in wage inequality (Gottschalk and Smeeding 1997), other evidence also contradicts the findings of Berman, Bound, and Griliches (1994). Capelli (1996) studied data from the 1984 EQW (National Center on the Educational Quality of the Workforce) National Employers Survey, which included measures of organizational technological change and data on the intensity of capital and computer use at the establishment level. He found that the ratio of the annual pay of production workers to that of supervisors was positively correlated with having a total quality management (TQM) program, with capital intensity, with the percentage of supervisors using computers, and with rising skill standards for production jobs. As with the attempts to quantify the trade-inequality relationship, the data may not permit an examination of what appears to be a highly complex relationship between technological change and changes in the structure of wages.

### **Skill Upgrading**

As indicated, the rise in wage advantage associated with skilled work has been accompanied by a rise in the skill mix of the U.S. workforce. Employers are hiring relatively more skilled workers today than they did in the past, even though the labor market forces them to pay a significantly higher wage to skilled workers, which suggests the importance of shifts in labor demand.<sup>7</sup> While it seems obvious that such change in the skill mix of jobs would be related to technological change, the evidence yields mixed results. As with the evidence on the relationship between technology and wage inequality, the combined effect of a highly complex relationship between the skill mix and technological change restricts our ability to measure the impact of technological change on skill upgrading.

For example, Howell and Wolff (1991 and 1992) and Wolff (1995) showed that differences in the pace of skill upgrading across industries were closely

correlated with the differences in capital intensity, computer use, and investment in research and development. The two studies also suggest that skill upgrading was most pronounced during the 1970s and may have slowed significantly during the rise in wage inequality during the 1980s.

Cappelli (1993, 1996) found some evidence that skill upgrading was correlated with the adoption of new office technology and with the adoption of total quality management and just-in-time production in manufacturing firms. However, he also found that significant skill downgrading occurred as a result of technological change in the computer support, office equipment, and telephone operator categories. Head (1996) also cited many examples of skill downgrading in response to new technology, and Levy and Murnane's (1996) study of the introduction of computers in a bank department suggested that the changes in labor demand stemmed more from changes in the demand for the service than from changes in the skills required.

## **Institutions**

Another group of studies focused on the role played by trade unions and by the minimum wage in the widening of wage inequality. During the 1980s, the relative drop in union membership, evident since the early 1960s, accelerated significantly. By the end of the decade, fewer than 20 percent of U.S. workers were covered by union contracts. Since unions have been found to have an equalizing effect on the wage distribution, the drop in union contract coverage has been seen as a possible cause of the widening wage gap. Indeed, Freeman (1993) calculated that the drop in union membership might account for as much as 40 percent of the rise in the college/high school wage differential in the United States. Machin (1997) estimated that the drop in union membership explained 40 percent of the 1983-1991 rise in the variance of the logarithm of annual wages in the United Kingdom. Karoly and Klerman's (1994) study of cross-state data for 1973-1988 found that falling rates of unionization led to higher variance in real wages. Freeman (1996) has argued that differences in collective bargaining institutions are the best explanation for the sharp differences in wage inequality between countries. Since Karoly and Klerman's study is the only one to estimate the effects of unions while controlling for other determinants of the variance in wages, it is not clear how robust these estimates are (Gottschalk and Smeeding 1997).

In the United States, the legal minimum wage also fell considerably in inflation-adjusted terms during the rise in wage inequality of the 1980s. Since the minimum wage establishes a legal floor for the wage distribution, the drop in its real value should have led to greater inequality, at least at the low-wage end of the distribution. Simulations by Horrigan and Mincy (1993) showed that keeping the real minimum wage constant during the 1980s would have had only modest effects

on wage inequality among men. On the other hand, DiNardo, Fortin, and Lemieux (1996) estimated that the drop in the real minimum wage might account for 25 percent of the 1979-1988 rise in wage inequality among men and close to 30 percent of the rise in wage inequality among women. DiNardo and Lemieux (1997) noted that differences between the United States and Canada in both the drop in union membership and the fall in the minimum wage can account for two-thirds of the difference between those countries in the rise in wage inequality between 1981 and 1988. The relative importance of changes in unionization and in the minimum wage as determinants of growing wage inequality remains an important question for further study.

### **Race and Sex**

The composition of the U.S. workforce by race and sex has changed substantially over time. From 1970 to 1997, the percentage of women in civilian employment rose from 38 percent to 46 percent, while the percentage of nonwhites rose from 11 percent to 15 percent. These changes could be expected to have augmented the rise in wage inequality since the wage level of both the median female and the median nonwhite worker falls well below the median for white males. And, to the extent that male/female and white/nonwhite wage ratios reflect skill differences, the strong rise in returns on skills would be expected to widen the wage gap for women and nonwhites.

In fact, those possibilities did not materialize. Schweitzer (1997) concluded that the importance of race and sex differentials in overall wage inequality dropped significantly from 1973 to 1991. Moreover, the trend toward rising overall wage inequality was accompanied by a drop in male/female wage differential in both the United States (Blau and Kahn 1994) and the United Kingdom (Blackaby et al. 1997). There is also evidence of a stable racial wage differential in the United States during the 1980s (Card and Lemieux 1994).

The change in the demographic composition of the workforce has been accompanied by a rise in the relative experience and occupational standing of women and nonwhites. Blau and Kahn (1994) also found that the unexplained portion of the male/female wage differential has diminished over time. They attributed that to the combined effect of increased relative unmeasured skills, reduced labor market discrimination, and a shift in labor demand to patterns favoring women, especially those with lower skill levels. Thus the much-studied demographic differences in the U.S. labor market have not proven to be important in explaining the changes in the overall distribution of wages.

## **Within-Group Inequality**

The increase in wage inequality in the United States and other countries has resulted both from changes in the relative wages across skill groups and from changes in the distribution of wages among workers with a given skill. In parallel with the evidence for rising wage returns on schooling, experience, and other measured forms of worker skill, the evidence for rising within-group inequality has been interpreted by Juhn, Murphy, and Pierce (1993) and others as the result of rising returns on unmeasured skills. Two recent studies looked at changes in wage inequality for specific occupational groups.

Ferrall's (1995) study of the rise in wage inequality among engineers from the mid 1970s to the mid 1980s found that it was largely explained by a rise in the wage differentials associate with higher levels of supervisory responsibility within firms. The rise was further traced to a shift in the demand, away from mid-career, middle-level engineers toward both younger, low-wage and older, higher-wage engineers.<sup>8</sup> This twist in the demand for engineers by skill level (which might reflect corporate downsizing) reveals more complexity in changing returns on skill than that seen in the evidence for schooling or overall experience.

Baker, Gibbs, and Holmstrom (1994) examined the pay structure for managers in a single firm from 1969 to 1988. They identified three sources of inequality within that group. First, the mean real starting salary for cohorts of new managers was sensitive to the business cycle, falling markedly from 1974 to 1976, from 1979 to 1980, and from 1981 to 1982. This is important because differences in the mean salaries of different cohorts were highly correlated with differences in starting salaries. Second, individual real-wage levels within each cohort diverged significantly with tenure, reflecting rapid real-wage increases for high performance and promotions and the lack of real-wage protection for poor performers. Third, they noted that wage variances within all cohorts began to rise at a faster rate after 1980.

These papers illustrate how changing wage relationships within groups of homogeneous workers can give rise to rising wage inequality. They also support the findings of Davis and Haltiwanger (1991) and Groshen (1991a, 1991b) that changes in the wage distribution within plants and firms can account for a substantial portion of changes in the wage structure for all workers.

## **THE SAMPLE OF LOCAL LABOR MARKETS**

Our approach to the study of changes in wage inequality in local labor markets, much like the study by Karoly and Klerman (1994) already discussed, uses data for a panel of local labor markets tracked from 1974 to 1991. Substantial

changes in the boundaries for an urban area often make it difficult to compare data over time. For that reason, the primary criterion used to select the areas for the sample was that the Area Wage Survey (AWS) boundaries be substantially unaltered for the period under study. The sample is also restricted to large urban areas because these had more extensive occupational coverage in the AWS and are more frequently included in other data sources, such as the *Geographic Profile of Employment and Unemployment*, than are smaller metropolitan areas.

Using these criteria, there are 20 large urban labor markets in the sample. These include the following 13 urban areas which had unchanged AWS boundaries: Anaheim, Chicago, Cincinnati, Cleveland, Indianapolis, Los Angeles, Miami, Milwaukee, Nassau-Suffolk, Philadelphia, San Diego, San Jose, and Seattle. The sample also includes five metropolitan labor markets which added one or more counties during the period studied but where the added counties accounted for 5 percent or less of the area's population in 1990. These are Atlanta, Baltimore, Detroit, Minneapolis, and St. Louis. Finally, the sample includes Houston and New York, even though their AWS boundaries were altered by the deletion of one county during the period. In each case, the population of the deleted county amounted to less than 10 percent of the area's 1990 population. The 20 areas then constitute the inter-urban, cross-section part of the data panel.

The time-series part of the panel reflects the fact that the AWS program consisted of two different employer surveys. About every third or fourth year, employers were visited by U.S. Bureau of Labor Statistics field agents who collected information on benefits and union contract coverage along with detailed occupational wage data. In the years between those employer visits, the Bureau used telephone and mail surveys to collect just the wage information. Since the interest here is in gradual structural changes, and since benefit and unionization data are of interest, the panel data set includes data only for the years in which Bureau field agents visited employers. The analysis begins with 1974, because a number of changes in the AWS methodology began in 1973, and it ends in 1991, because in that year the substantially altered Occupational Compensation Survey supplanted the Area Wage Survey. Table 1.1 lists the years in the time series for each of the 20 metropolitan labor markets. The unbalanced panel that results has 111 observations, with data from each year from 1974 to 1991 across the 20 metropolitan labor markets. (See Appendix A for details.)

**Table 1.1 Metropolitan Areas and Survey Years in the Panel Data Set**

Metropolitan area	Years					
Anaheim	1975	1978	1981	1984	1988	
Atlanta	1975	1978	1981	1984	1987	1991
Baltimore	1975	1978	1981	1984	1987	1991
Chicago	1974	1977	1980	1983	1986	
Cincinnati	1974	1977	1979	1982	1985	1989
Cleveland	1974	1977	1980	1983	1986	1990
Detroit	1976	1979	1982	1985	1989	
Houston	1974	1977	1980	1983	1986	1990
Indianapolis	1975	1978	1981	1984	1988	
Los Angeles	1975	1978	1981	1984	1986	1989
Miami	1975	1978	1981	1984	1987	1990
Milwaukee	1975	1978	1981	1984	1987	1991
Minneapolis	1975	1978	1981	1984	1987	1991
Nassau-Suffolk	1975	1978	1981	1984	1987	
New York	1975	1978	1981	1985	1989	
Philadelphia	1976	1979	1982	1985	1988	
St. Louis	1976	1979	1982	1985	1989	
San Diego	1974	1977	1980	1983	1986	1989
San Jose	1975	1978	1981	1984	1988	
Seattle	1974	1977	1979	1982	1985	1988

The local labor markets in the sample are fairly well dispersed around the country. Three areas are in the Northeast census division, eight are in the Midwest division, four are in the South, and five are in the West. The 20 areas in the sample are also fairly well dispersed in terms of economic performance of their manufacturing sectors during the 1980s. A recent study by Nojonen, Markusen, and Driessen (1997) provides a shift-share analysis of changes in employment in U.S. Metropolitan Statistical Areas (MSAs) from 1978 to 1986 and gives measures of the sensitivity of the local mix of manufacturing to exports, imports, and productivity growth. Their cluster analysis of the data led them to a fourfold

classification of metropolitan areas. They identify “trade winners” as MSAs with a manufacturing mix that generated strong performance in domestic and export markets and saw high growth in productivity. The trade winners included Anaheim, Minneapolis, Nassau-Suffolk, San Diego, and San Jose, all in the sample of local labor markets.

Four areas in the sample fall into Nojonen, Markusen, and Driessen’s “trade loser” category, areas where the manufacturing mix exhibited weak domestic and export performance. The four areas are Cleveland, Detroit, Houston, and Milwaukee. Five areas from the sample—Indianapolis, Los Angeles, New York, Philadelphia, and Seattle—are included in the strong domestic market category of their study. The remaining areas in the sample—Atlanta, Chicago, Cincinnati, Miami, and St. Louis—are identified as MSAs having import-resistant industry mixes. The sample of 20 local labor markets is evenly spread among their four categories of metropolitan area manufacturing performance. The categories are not, however, closely related to the census divisions for the areas in our sample. One can find Rust-Belt and Sun-Belt areas in each of their four clusters.

## **THE AREA WAGE SURVEY DATA**

The AWS program began in the late 1940s and collected information on wages and benefits for jobs common to a wide range of industries where local economic conditions were important determinants of pay.<sup>9</sup> Over the years, the AWS expanded to cover more job titles and more places. In 1991, it was replaced by the Occupational Compensation Survey. The AWS covered firms in six private-sector industries: 1) manufacturing, 2) transportation, communication and public utilities, 3) wholesale trade, 4) retail trade, 5) finance, insurance, and real estate, and 6) services. Small firms, generally those with fewer than 50 employees, were excluded from the surveys. The site visits sampled firms by industry and by number of employees. In reports of combined data, firms were weighted according to their probability of selection in order to generate unbiased estimates.

The job titles included in the AWS were grouped into four occupations: 1) office-clerical workers, 2) professional and technical employees, 3) maintenance, toolroom, and power-plant workers, and 4) material movement and custodial workers. For brevity, this study refers to the four occupational groups as the office-clerical, professional-technical, skilled maintenance, and material movement groups. Table 1.2 lists the job titles included in each occupational group. Although workers in just 41 job titles are included in the data for the study, those job titles represent a substantial portion of the total employment in firms surveyed in the AWS. For example, in the December 1989 Area Wage Survey for Los Angeles, the total number of workers in those job titles was 172,096. That represented almost one-third of Los Angeles’ 521,813 workers, which included executives,

managers, full-time production and office workers, and seasonal and part-time workers employed in the surveyed establishments. There is also evidence that wages for those jobs are representative of wages in closely related jobs that were not covered by the AWS (Special Reports Group 1975).

**Table 1.2 Job Titles for the Four Area Wage Survey Occupation Groups**

Office-Clerical	Skilled Maintenance
Secretary	Carpenter
Stenographer	Electrician
Typist	Painter
Word processor	Machinist
Key entry operator	Maintenance mechanic
Accounting clerk	Pipefitter
Payroll clerk	Millwright
File clerk	Motor vehicle mechanic
Messenger	General maintenance worker
Receptionist	Machine-tool operator
Switchboard operator	Tool and die maker
	Stationary engineer
Professional-Technical	Material Movement
Computer systems analyst	Truck driver
Computer programmer	Shipper and receiver
Computer operator	Warehouseman
Drafter	Order filler
Electronics technician	Shipping packer
Registered industrial nurse	Material handling laborer
	Forklift operator
	Guard
	Janitor

The AWS allocated job titles through a uniform set of job descriptions designed to account for inter-firm differences in duties. The AWS also collected wage data for full-time workers who worked a regular weekly schedule. The data excluded overtime pay; weekend, holiday, and late-shift premiums; and bonuses and lump-sum payments. It reported regular straight-time weekly salaries and standard workweek hours for the office-clerical and professional-technical groups, so it is possible to estimate hourly wage rates for workers in those jobs.

The AWS data offer some advantages for studying changes in the wage structure in local labor markets. One important advantage is that the AWS collected data on-site on the wages for full-time workers in specific jobs. Thus there is no need for concern about the potential impact of job turnover or of errors in worker-reported earning (Gottschalk and Moffitt 1994). A second advantage is that the AWS data covered large numbers of workers drawn from stratified

samples representative of medium and large firms in specific industries in each locality. While the CPS could be used to construct local-area samples, its sample sizes for each area are small, and the survey itself is designed to be nationally, not locally, representative.

The main advantage of the AWS data is that it did not include information on workers' personal characteristics or on the characteristics of their employers. While the AWS data precludes estimating a human capital model, there is a growing recognition that job-related wage determinants, such as occupation or the size of the firm, add substantially to the usefulness of the human capital model (Groschen 1996). The sample here uses job-skill requirements from the *Dictionary of Occupational Titles* to examine the effects of skill on wages. Groschen (1996) noted that since the AWS program covered workers in jobs common to a wide variety of employers, the AWS wage data may be less affected by employer-specific wage determinants that would be the case for jobs that are found only in a limited range of firms and industries.

## **THE PLAN OF THIS BOOK**

Chapters 2 and 3 present a descriptive analysis of changes over time in the structure of wages in the panel of 20 metropolitan labor markets. Chapter 2 concentrates on trends in the variance of the logarithm of real hourly wages and on trends in the real wage differentials between the 75<sup>th</sup> and 50<sup>th</sup> percentiles and the 50<sup>th</sup> and 25<sup>th</sup> percentiles in wage distribution. In general, Chapter 2 concludes that changes in the local wage structure over time follow patterns similar to those found in earlier studies of national data. Chapter 3 looks at trends in the availability of benefits (for example, health insurance and pensions) and at the extent of union contract coverage across the 20 labor markets over time. Changes in benefit coverage were not as extensive as changes in wage rates and appear to have been closely related to union contract coverage.

Chapters 4 and 5 examine determinants of the level and distribution of wages. Chapter 4 tests the hypothesis that returns on skills rose during the 1980s. It uses regressions for the average real hourly wages for specific job titles and for the measures of skills required for those jobs, comparing results from the late 1970s with those for the late 1980s. While evidence exists for a general rise in returns on skills, the results vary considerably for training, job level, cognitive skills, and machine-related skills. Chapter 5 examines the role of labor market forces, union contract coverage, and the real minimum wage in explaining the changes in wage structure. The results suggest that changes in wage inequality both between and within occupational groups were closely related to all three variables. The study ends with a summary chapter that examines some policy implications of the research.

## Notes

1. Throughout this text, *wage inequality* means the degree to which hourly wage rates are unequally distributed among individual workers. *Wage dispersion* is a synonym for wage inequality. *Wage structure* refers to the way hourly wages vary among workers due to their occupation, industry, skill level, etc. Changes in the wage structure are an important cause of increased wage inequality.
2. Cognitive skills reflect a person's ability in language, mathematics, reasoning, and problem solving. While cognitive skills are related to years of schooling, they also vary considerably among individuals having a given level of educational attainment.
3. However, an interesting analysis by McConnell and Quiros (1998) reported a statistically significant reduction in the volatility of U.S. real GDP growth after 1984. They traced this to a reduced volatility in the production of durable consumer goods associated with a decline in the inventory ratio in the industry.
4. Bernard and Jensen (1997) also found that changes in the relative wages and employment of nonproduction workers in U.S. manufacturing were affected by trade. In their study, however, export sales rather than import competition proved to be important.
5. Throughout this book, the use of the term *logarithm* refers to natural logarithms.
6. While it might be expected that the labor market effects of trade are easier to measure than those related to technological change, considerable debate has emerged over the relevance of factor-content versus relative prices as a trade-impact variable and over the appropriate method of calculating the factor-content of trade. See Burtless (1995) and Wood (1995).
7. Gregg and Manning (1997) emphasized that in the long run the skill-supply response determines relative wages and employment. While the skill supply depends in part on incentives for workers investing in new skills, they argue that such decisions are also very responsive to public policy.
8. This pattern was also found by Gittleman and Howell (1995) in their study of shifts in employment across job clusters that were closely linked to skill requirements.
9. The description of the AWS survey program and its methods is based on Scofea (1986), Hotchkiss (1990), and Barkume (1996), and on the Scope and Method of Survey Appendix to the published AWS Reports. See also the *BLS Measures of Compensation* (Bureau of Labor Statistics 1986).