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Technological Change and the Demand
for Skills in the 1980s: Does Skill Mismatch
Explain the Growth of Low Earnings?

by

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ABSTRACT

The earnings of low-skill workers have suffered substantial declines since the mid 1970's. The conventional explanation is that a technology-induced increase in skill requirements has resulted in a growing mismatch between the skills demanded by firms and those supplied by the workforce: declining demand for low-skill workers led to falling relative (and real) wages. But neither statistical nor case study evidence indicates that this period was characterized by a fundamental, economy-wide transformation in production technology or by a shift in the long-term upward trend in skill requirements whose timing and magnitude could account for the wage restructuring. What the evidence does suggest is that the collapse in wages was largely unrelated to skill restructuring. In the face of sharply increasing competition, employers adopted a "low-road" strategy aimed above all at reducing labor costs, through wage concessions from workers, the replacement of full-time with part-time and temporary workers, an increased reliance on low-wage outside contractors, and relocation to low-wage sites - a human resource strategy that was facilitated by rising supplies of workers willing to accept low wages (e.g., displaced high-wage workers and low-skill immigrants) and a variety of government policies. The mismatch appears to be less between skills demanded and skills supplied than between skills demanded and wages paid. This suggests that while there is a need to improve our education and training system, improving worker skills will not, by itself, have much impact on the distribution of earnings.

After rising steadily for almost three decades, the real weekly pay of production workers has collapsed since 1973, falling by an extraordinary 20 percent. While real earnings fell continuously over these last two decades, almost three-quarters of the decline took place prior to 1983.¹ This decline in living standards has coincided in the 1980's with a sharp drop in the relative wages of low-skilled male workers and contributed to an unprecedented surge in earnings inequality. The mean earnings of employed male high school graduates fell by about 12 percent between 1979 and 1989, from \$28,400 to \$25,018. For those with jobs and just 9-11 years of education, the earnings collapse was almost twice as large, about 23 percent, falling from \$23,900 in 1979 to \$18,400 in 1989. At the same time, the incidence of "low earnings" (defined as the poverty line for a family of four) doubled between 1979 and 1989 for employed male high school graduates, increasing from 8 to 15 percent; for men with only some high school, the share of the workforce with poverty-wage earnings more than doubled, rising from 13 to 30 percent. The problem of low-earnings was substantially worse for black and Hispanic men: 25 percent of all employed black men and 41 percent of all employed Hispanic men with less than a high school degree earned poverty-level incomes in 1989 (Acs and Danziger, 1993: Tables 1 and 3).

The conventional explanation for this disastrous labor market performance is that a fundamental shift has taken place in the mix of skills required in the workplace. As the demand for low-skill workers has declined, a growing mismatch developed between the skills demanded by firms and those supplied by the workforce. The result is declining relative earnings. Recent trends in unemployment rates, labor market participation rates and real wages for low-skilled workers have been frequently cited in the professional literature in support of this mismatch thesis. Chinchui Juhn (1992:99) concludes from these aggregate trends, for example, that "job market opportunities have ... deteriorated significantly for less-skilled workers." Similarly, Topel (1993:110) finds that "virtually all of the long-term increase in joblessness occurs among low-wage men," and concludes that the best explanation is "a

¹Real weekly earnings dropped from \$315 in 1973 to \$292 in 1979, falling further to \$272 in 1983, \$264 in 1989 and \$255 in 1992 (Economic Report of the President, 1991: Table B-44; Monthly Labor Review, July 1993).

secular decline in the demand for less-skilled workers." Referring to the rise in the wage premium for more educated workers, Murphy and Welch (1993a:109) state that "we view these changes as indicating increasing demand for general discretionary skills." Secretary of Labor Reich (1993), citing evidence of rising shares of poverty-wage workers and growing wage inequality, has written that "The long-term crisis in advanced industrial nations reflects in part a shift in relative labor demand against less-educated workers and those doing routine tasks and toward workers with problem-solving skills."

The most common explanation for this shift in the demand for skills, at least among economists, is technological change. Although their statistical tests did not include direct measures of technological change, Bound and Johnson (1992:371) assert that the "major cause (of relative wage changes in the 1980's) was a shift in the skill structure of labor demand brought about by biased technological change." Similarly, Acs and Danziger (1993:632) conclude that since most of the decline in earnings is found within industries for workers with the same education and experience levels and cannot be accounted for by the standard measures used in earnings studies, "changes in technology, whether autonomous or in response to foreign competition, provide the most plausible explanation for the fall in mean earnings." The implication of the mismatch explanation is that the rising incidence of low-wages and the growth of earnings inequality over the last two decades in the U.S. are the natural and impersonal consequences of the interaction of technical progress and market forces.

If this diagnosis is correct - that unlike previous decades, technological change in the 1980's has dramatically shifted the demand for labor in favor of high-skilled workers, resulting in a growing share of poverty-wage workers - the prescription is straightforward: we must increase the number and quality of applicants for the growing pool of high skilled jobs. The answer, in short, is the standard supply-side remedy of more and better education and training. Indeed, the implication of the mismatch story is that we are twenty years too late: a choice to invest more heavily in skills back in the 1970's could have alleviated the skill mismatch and fundamentally altered the course of future earnings trends. Given the nature of technological advance, the nation effectively "chose" a low-wage path by failing to invest the resources necessary to increase the literacy of a large segment of the working age population.

It is revealing in this regard that the Commission on the Skills of the American Workforce (1990) entitled their extremely influential report "America's Choice: High Skills or Low Wages!." In order to cope with what he has termed "the mismatch between the skills Americans have and the skills the economy requires," Secretary Reich (1993) has called on workers to "Get Smart." To facilitate skill upgrading, the "Clinton agenda for the workforce" proposes five policies: improved basic education, more affordable college, school to work apprenticeships, training for displaced workers, and incentives for lifetime learning in the workplace.

These are admirable goals and their implementation will surely contribute to a more competitive America sometime in the 21st century. But as Section 1 will attempt to demonstrate, skill mismatch does not adequately explain the recent earnings problems of low-skill workers. There is little evidence to support the notion that the earnings problems of the last two decades stem from a failure to make workers "smarter" in response to a technologically-induced shift in the demand for skills by employers. While the expansion of "problem-solving" jobs is real, the transformation of the skill distribution is gradual and part of a century-long trend. Indeed, if declining demand due to new workplace technologies was the major source of the falling relative wages for low-skilled workers, the *rate* of decline in the relative earnings of these workers should have become progressively worse over the last two decades, which is not what the data show. It should also be recognized that our economic competitors, such as France and Japan, who are introducing the same workplace technologies, have not experienced anything like the same explosion in earnings inequality and collapse in real earnings at the bottom of the skill distribution (see Katz, Loveman, and Blanchflower, 1993).²

The uniqueness of the post-1973 period was not an unusually strong shift in demand away from *low-skill jobs*, reducing job opportunities and lowering wages, but rather a dramatic growth in the demand for *low-wage workers*. Section 2 describes employment trends over this period. These trends offer little support to the thesis that there was a sharp

²It is interesting that Great Britain, with a strong legacy of hostile employer-employee relations and not among the leaders in the use of computer-based production technologies, does show earnings patterns similar to the U.S..

decline in low-skill job opportunities in the last decade and a half, or that this decline worsened over the period, which is implied by the technological change explanation. While the conventional view assumes, or is at least consistent with, the simple competitive model of the labor market in which skill and wage distributions are equivalent,³ the skill and wage *distributions* for nonsupervisory workers are in fact substantially different (see Howell and Wolff, 1991a); furthermore, skill and wage *trends* for nonsupervisory workers did not correspond in the 1980's: while the cognitive skills supplied by workers and required on-the-job continued a long-term secular increase, their relative and real wages sharply declined. If technological change biased the demand for labor away from those with low skills, and we take seriously the conventional assumption that the wage distribution reflects the skill distribution, there should have been a decline in the share of workers with low-wage jobs and steadily rising rates of joblessness among the low-skilled throughout the 1980's as computer-based systems became more widely and effectively used. But the data show large *increases* in low-wage jobs, in goods as well as service industries, and joblessness did not increase after the recessions of 1980-82. In fact, the last decade and a half has made it abundantly clear that the choice concerning the nonsupervisory workforce is not limited to high skills or low wages - the current trajectory is towards gradually higher skills with dramatically lower wages.

A convincing account of the massive wage restructuring since the mid 1970's requires looking much more closely at what has happened to "wage-setting institutions." Although the main purpose of this paper is to question the adequacy of the mismatch story, Section 3 will outline an "institutionalist" alternative. In brief, employers in the 1970's and 1980's, facing increasingly competitive product markets, abundant supplies of low-skill workers and a comfortable ideological climate, chose a variant of the "low-road" human resource strategy, one that aimed above all to substantially reduce labor costs in the short run. Companies demanded wage and benefits concessions and "downsized" by slashing the number of full-

³This is made explicit in many studies. For example, describing his methodology for examining the incidence of unemployment across skill groups, Topel(1993:110) writes that "I will define relative marketable 'skills' in terms of a person's position in the overall distribution of wages." Similarly, Berman, Bound and Griliches (1993:5) confidently assert that "Changes in the wage bill share will reflect changes in relative skill levels."

time employees, whose earnings had been determined under union contracts or within structured internal labor markets, and replaced them with part-time and temporary workers. The same objective was achieved by contracting out to low-wage suppliers. Skill obsolescence due to technological change played at most a supporting role in this restructuring. But in addition, technology may have contributed to the wage collapse via the supply side: new computer-based technologies have helped facilitate a reduction in staffing requirements for moderately skilled white-collar workers (e.g., lower-level managers and their clerical staff) many of whom, together with legions of displaced high-wage blue-collar workers and sharply rising numbers of low-skill foreign workers, became part of a rising supply of workers competing in the low-skill labor market.

1. Skill Mismatch - A Preliminary Assessment of the Evidence

It seems almost universally accepted in the labor economics literature that the deterioration in the earnings status of most nonsupervisory workers over the last two decades is best explained by a shift in skill requirements which, in turn, led to a sharply declining demand for low skilled workers. Reflecting this conventional view in their survey of the recent earnings literature, Levy and Murnane (1992:1372) state that "Declines in the relative demand for less educated workers occurred within industries - most dramatically within manufacturing where semi-skilled jobs declined at a much faster rate than overall manufacturing employment. These declines played a key role in explaining both the loss in real earnings for young high school graduates and high school dropouts, and the increase in the gap between the earnings of high school graduates and college graduates."

This claim, that declining demand for low-skill workers played a key role in shaping recent earnings trends, is quite common but the statistical tests that appear in the research they survey do not (and were not designed to) establish this link. Indeed, just two paragraphs later, Levy and Murnane (1992: 1372) write that "To date, solid evidence on the nature and extent of this (skill) mismatch is hard to come by." Perhaps more fundamentally, the important empirical question is not whether there has been an overall decline in demand, but whether it was so much greater in magnitude than changes in previous decades that it could plausibly account for the unique wage restructuring we have observed since the mid 1970's.

The recent earnings literature has not focused on this question.

There is little doubt that semi-skilled jobs have declined in manufacturing, but it is less obvious that all, or most, industries have experienced large declines in low-skill jobs. Some low-skilled jobs in some industries have clearly grown - for example, while male employment increased by 13.6 percent between 1983 and 1988, male *Sales Workers* in retail and personal services increased by 16.4 percent and male *guards* increased by over 20 percent (U.S. Department of Labor, 1989). Nor does the timing appear consistent with this story. Berman, Bound and Griliches (1993:2) present data showing an increase in the nonproduction share of employment as evidence that there was substantial skill upgrading in the 1980's: "Between 1979 and 1989 the employment of production workers in U.S. manufacturing dropped by a dramatic 15 percent from 14.5 to 12.3 million, while non-production employment rose 3 percent from 6.5 to 6.7 million." But as their Figure 1 clearly indicates, all of this "skill upgrading" took place in just 3 years - 1980, 1981 and 1982: the nonproduction share of employment in 1989 was identical to the share in 1983. These results look less like a trend characterizing the 1980's than a one-time shock during a three year period of back-to-back recessions. Yet, the decline in relative wages of low-skilled workers as well as the growth in inequality continued throughout the 1980's. The implications of this timing for a technological change explanation, which is advanced by Berman, Bound and Griliches, is considered below.

Part of the confusion in this discussion is that not all "less-educated" workers are employed in similar jobs, and semi-skilled manufacturing jobs are a particularly poor example of the presumed across-the-board decline in demand for low-skilled workers since they tend to be much better paid than most. In previous work I distinguished semi-skilled manual occupations from "routine" manual occupations on the basis of both motor skills and cognitive skills scores from the Dictionary of Occupational Titles. The employment data show that semi-skilled jobs have declined sharply since 1950, with the greatest percentage declines in the 1970's and early 1980's. But routine manual jobs (such as stock handlers, cleaning service, and food service workers) which pay much less and have *lower* cognitive skill requirements (and lower average educational attainment levels) *declined less* than semi-skilled jobs in the

1970's and actually *increased slightly* in their share of total employment in the 1980's (Howell and Wolff, 1991b). As this suggests, and Section 2 will further demonstrate, recent employment trends do not support the notion that there was an unusually strong decline in demand for low-skill workers in the 1980's.

"Declining demand" might, however, be interpreted not in terms of job opportunities which can be measured by employment trends but in terms of value (marginal productivity) to employers. Technological change may have deskilled - but not yet displaced - large shares of low-skilled workers, resulting in stable or growing employment but declining relative and real earnings. But if wages really reflect relative skills (see footnote 3), growing earnings inequality within industries should be associated with widening skill differentials.

But the data show little support for this expectation. Building upon earlier research by Karoly (1992), Wieler (1993) finds that changes in both worker characteristics (such as education or experience) and skill requirements due to shifts in the occupation mix of employment do a poor job of accounting for the steady increase in earnings inequality within industries observed throughout the 1980's. Particularly striking are the results at the industry level. Figures 2a, 2b and 2c report the variance of hourly earnings, educational attainment, and three measures of skill requirements from the Dictionary of Occupational Titles for each year from 1975 through 1990 for three industries that experienced dramatic increases in earnings inequality. Figure 2a shows that the variance of hourly earnings in the Auto industry increased from .190 to .298 over this period, almost all of which took place after 1979. Yet, the skill measures all show remarkable stability - the data show no evidence of a growing dispersion of skill levels that parallels the rapid growth in earnings inequality. The same results can be seen in Figure 2b (Electrical Equipment) and Figure 2c (Business Services).

Despite the apparent circularity (since we are trying to explain the massive wage restructuring), the evidence for changes in the mix of skills demanded in the workplace is usually limited to relative wage trends. But are wage trends a reliable guide to changes in the demand for skills? There is, as mentioned above, little evidence that the wage distribution is a good (much less perfect) proxy for the skill distribution, whether skills are measured by cognitive skills, motor skills or interactive ("people") skills, particularly for nonsupervisory occupations (Howell and Wolff, 1991a). While it is true that, all else equal, more education tends to be

associated with higher earnings, all else is not equal; many other factors are equally or even more important for wage determination, including gender, race, union coverage, firm size and industry of employment (see Groshen, 1991). One only has to ask, for example, why most nonsupervisory jobs dominated by women pay substantially less than those dominated by men despite far higher average educational attainment required in the "female jobs." And if these "female jobs" happen to be increasingly located in small firms in competitive industries, they will tend to pay even less over time, even if their relative skill levels have risen. In addition, wage-setting may be affected by less measurable factors like employer and employee militance, changes in collective bargaining laws, and changes in the enforcement of government regulations affecting earnings and conditions of work.

High unemployment and nonparticipation rates have also been cited as evidence of a declining demand for low-skill workers (see Juhn, 1992; Topel, 1993). But the low-skilled have always shown higher unemployment and nonparticipation rates than higher skilled workers, for obvious reasons; one is that the jobs available to lower skill workers are not as good and there is less incentive to maintain a stable employment record. The worsening of these rates may occur independently of changes in the demand for low-skill workers through increases in competition from new sources of labor supply (increases in female participation, demographic shifts that increase the numbers of young workers in the labor market, displacement of higher wage workers, and rising numbers of low-skilled foreign workers) or as a result of a decline in job quality (e.g., falling earnings and benefits or rising job insecurity). Both factors are likely to have been at work since the early 1970's: employer wage and employment policies and the crowding of workers into the secondary labor market tended to lower the quality of secondary jobs, increasing joblessness through higher turnover (as workers search for better jobs) and rising numbers of discouraged workers. This, however, is not the usual explanation in recent studies of joblessness. The conclusion that declining demand for low-skill workers is the source of the problem may, again, be traced in part to the assumption that skill and wage distributions are identical.⁴

⁴If skill levels are defined by the wages a worker is paid, a decline in wages appears as a decline in skill (skill obsolescence) and, consequently, a decline in demand for those skills; if

Methodology aside, it is worth noting that in fact the employment/population ratio did not decline in the 1980's. As Juhn's (1992:Figure 3) data show, participation rates for both white and black male high school dropouts and high school graduates rose steadily from 1982, a recession year, to 1987. For young (20-24) black males - a demographic group as likely as any to be negatively affected by a declining demand for low skill workers - the employed share of the population fell sharply from 72.6% in 1973 to 65.5% in 1979, and then dropped precipitously to 53.9% in 1982 (due mainly to the effects of the two recessions), but has risen steadily throughout the 1980's, reaching 63.9% in 1988 (U.S. Department of Labor, 1989, Table 16). In short, the decline in employment rates between 1973 and 1988 for these workers took place almost entirely before 1982. Again, if the problem is skill mismatch due to the increasing skill requirements of new workplace technologies, why did most of the change take place in the 1970's and not in the mid and late 1980's?

A strong case for skill mismatch as the explanation for the earnings problems of low skilled workers in the 1980's requires more than simply evidence of declining relative wages and low employment rates. Undoubtedly, the attractiveness of the story is its consistency with both the observed declines in the relative wages of low skilled workers in the 1980's and the popular vision of the effects of computer-based mechanization in the workplace. With the rapid diffusion of computer-based production technologies and an increasingly competitive environment, the old regime of large, integrated, capital-intensive plants relying on low-skill manual labor is being transformed into a new production system of small, flexible, technologically advanced firms that depend upon an elite cadre of highly educated workers. Unlike the traditional "Taylorist" model, in the new "high performance" workplace workers must possess the cognitive and diagnostic skills necessary to perform a broad range of frequently changing tasks. So the upshot is that computers and related technologies require higher skills and workers with obsolete or insufficient skills inevitably get paid less and ultimately lose

rising joblessness occurs as wages (skills) decline, it is then natural to assume that it is a decline in the demand for low-skill labor that accounts for rising joblessness. But if we "unbundle" the skill and wage distributions, increasing joblessness might be seen as the result of falling wage levels (which may reflect management practices, government policies, or supply side developments) with no necessary role for changes in the demand for skill.

their jobs, leaving behind a more skilled workforce.

This is a plausible story. But the question then becomes: did changes in production technology in the 1980's radically increase the skill mix of the workforce? Put differently, was the shift away from low-skilled work so much greater than it was in earlier earlier decades that it can be identified as the primary cause of the unprecedented two decade long plunge in both the relative and real wages of low-skilled workers?

Although the rising payoff to education is usually attributed to the increasing demand for skills generated by the use of new technology in the workplace, few statistical studies have actually employed either direct measures of new technology (as opposed to assuming, for example, that it is measured by the residual of the equation) or direct measures of skill requirements (in contrast to educational attainment or relative wages). Ed Wolff and I attempted to fill this gap by developing a number of measures of new technology, such as the value of computer purchases per dollar of output, the share of new investment in total capital stock, and the share of engineers in the total workforce, to help explain changes in skill requirements among industries. We measured skills with both indices of cognitive, interactive and motor skill job requirements from the Dictionary of Occupational Titles as well as the shares of five large occupation groups in total employment (Howell and Wolff, 1992).

Our results indicated that new production technologies have indeed tended to increase the cognitive skill levels of the workforce since 1970, with the strongest and most reliable effects occurring in the goods industries. The use of occupation shares as measures of skill levels produced mixed results: the deployment of new technology clearly raised the demand for professional and technical workers (high cognitive skill) while reducing the demand for managers (moderate-high skill), clerical workers (low-moderate skill), and operatives and laborers (low skill). These results suggest that while the effects of new production technology on skills varies by sector and occupation group, it is fair to say that, overall it tends to raise the demand for high cognitive skill workers and reduce the demand for low-skill workers. But the questions remain: Was the impact of technological change on the mix of skills required in the workplace substantially different from earlier decades? Was the impact large enough to cause the unique earnings patterns observed over the last decade? Can this drop in demand explain the decline in wages that has occurred even within rapidly expanding low-

skill service occupations?

From the vantage point of the entire economy, there is no doubt that there has been a gradual increase in the demand for highly skilled workers. As the late eminent economist Fritz Machlup pointed out in the early 1960's, the increase in the demand for information workers - those with relatively high cognitive skills - dates back at least to the turn of the century. While this was caused in large part by the shift away from agriculture in the early decades of the century, the same trend can be found in the goods industries since the 1940's. Indeed, the share of semi-skilled and low-skilled manual workers in total employment declined substantially in each decade from 1950 to 1980 (Howell and Wolff, 1991b). Several recent studies using economy-wide data on occupation and industry employment trends and direct measures of skill requirements have found declining rates of skill growth with each decade since the 1960's (Howell and Wolff, 1991a; Mishel and Teixeira, 1991). Using different data and methods, Murphy and Welch (AER, May 1993) concluded that "we do not find that the demand for skill grew particularly rapidly during the 1970's and 1980's, a period when wage inequality expanded in comparison to the three earlier decades...." Interestingly, the same Skill Commission whose theme was the necessity of choosing between high skills or low wages conducted a survey of employers and found that only 5 percent of the firms were actually concerned about a skill shortage. This is consistent with a new study on international competitiveness by McKinsey which concluded that it was not primarily skills or technology that distinguishes productivity rates among nations, but rather management and labor relations policies (cite).

Computer-based technologies do not appear to have had a significant impact on national employment patterns until the mid 1980's and their diffusion is almost certainly taking place at an increasing rate (see Howell, 1993). According to the technology-induced skill mismatch story, the earnings status of low-skilled workers should have been getting progressively worse throughout the decade. There is no evidence that this occurred. This raises questions about the conclusion reached by Berman, Bound and Griliches (1993) that "production labor-saving technological change is the most likely explanation for the shift in demand towards non-production workers...." As noted above, their data show that all of the shift took place between 1980 and 1982. Since it is widely recognized that there is some lag between the

purchase of new technologies and their effective utilization, their technological change explanation suggests a substantial, but one-time restructuring of manufacturing production processes in the late 1970's. This seems implausible. Furthermore, such an explanation suggests a long-term trend, not a three year "shock." ~~†~~ Case studies are also instructive. Shaiken (1993) describes a relatively new and technologically advanced Ford assembly and stamping plant in Mexico. This plant had higher quality ratings on the cars it produced than five of eight Japanese-owned factories in the United States. According to the skill mismatch account, a high-tech, high-performance manufacturing plant such as this should rely primarily on highly skilled workers - there should be relatively few job opportunities for low-skilled workers. But according to Shaiken (p. 60) "the average age of the initial workers hired was in the early twenties. All lacked auto industry experience. Thirty percent had a junior high school education and 63 percent had completed high school or a technical education." Evidently, high-tech, high-performance manufacturing is consistent with an extremely low-skill and inexperienced workforce.

On the other hand, perhaps the Mexican Ford plant is not representative. In his study of machine shops in the U.S., Jeffrey Keefe (1991:515-16) found that "the diffusion of NC (numerical controls) has had no significant impact on overall machine shop skill levels." Using data from a large compensation consulting firm, Peter Cappelli (1993:528) reports significant skill upgrading for most production occupations between 1978 and 1986, but consistent with Keefe's finding, the cause did not appear to be technological change: "Changes in production jobs seem much more driven by developments in traditional employee relations arenas. Particularly influential have been new management views concerning how jobs should be redesigned."⁵ Among clerical jobs, however, Cappelli (p.524) finds that half

⁵Cappelli nevertheless adopts part of what I have called the conventional view - that upskilling "must represent a shift in the demand for skill" since "requirements rose even as the price of skills was rising." The evidence he presents for a rising price of skills consists of a regression of community-wide skill change on wage change for production workers. The results show that wage growth is positively associated with skill change for the 25 communities he tested. Why aggregate community-level data are the appropriate level of analysis is not explained. Since the skill change results are presented as representative of national trends, it seems far more appropriate to compare them with trends in real production worker wages in

"experienced significant upskilling, and the other half had significant deskilling" and concludes that new office technologies appear to be the cause of the deskilling. Tilly (1992) also refers to the deskilling of cashiers by new electronic scanning systems. It should be noted that deskilling should have the effect of *increasing* market opportunities for those with the least educational attainment.

In a recent case study of changes in occupational employment in the commercial banking industry, Kuster (1993:24-25) concluded that despite substantial restructuring as a result of deregulation and the introduction of computer-based technologies, "commercial banks tended to retain their traditional occupational staffing patterns." In fact, despite the rapidly growing use of automated teller machines (ATM's), tellers actually increased in both number and share of total industry employment. Again, there is little evidence from this industry that technological change dramatically reduced market opportunities for low-skill workers in the 1980's.

While examples of large-scale technological displacement of low-skill workers probably exist, the case study literature suggests that technological progress in the late 1970's and 1980's did not revolutionize the skill distribution. The effects on job opportunities and skill levels vary by company, industry and occupation, and reflect a continuation of long-term trends. Neither statistical nor case study evidence indicates that there has been the sort of massive technological restructuring of the workplace that would be necessary to account for the wage collapse experienced by low-skill workers since the mid 1970's.

Indeed, part of the problem for low skill workers in the 1980's may have been a "reverse skill mismatch." With an *insufficient* demand for highly educated workers, many college graduates had to compete for relatively low-skill jobs, which had the effect of lowering the wage rates of already low-wage jobs.⁶ There is abundant evidence that computer-based

manufacturing. These *fell* over the time period he considers, which does not suggest a shift in demand.

⁶ This does not necessarily conflict with the evidence that the return to college education rose sharply in the 1980's. While growth in the "redundant" portion of the college educated labor supply will tend to reduce the absolute value of this return, increasing earnings by the unaffected (higher skill) part of the college educated pool could more than offset this effect.

technologies and corporate restructuring have made large numbers of middle-level managers redundant (see Howell and Wolff, 1992). Kuster's (1993) case study of the commercial banking industry found, for example, that between 1987 and 1990 there was a 13 percent decline (from 45,000 to 39,000) in general managers, a decline from 2.9 percent to 2.5 percent of total industry employment. The effect of this restructuring has been to force those with training for white-collar jobs to compete for jobs with low cognitive skill requirements.

In support of this twist in the skill mismatch story, data from the Panel Study of Income Dynamics (PSID) show that in the late 1970's about 40 percent of the sample reported themselves to be "over-educated" for their jobs (Sicherman, 1989). According to recent reports by economists from the U.S. Labor Department, throughout the 1980's about 20% of college graduates were working at jobs that don't normally require a degree, and this is expected to increase to 30% at the end this decade (Hecker, 1992; Shelley, 1992). Declining opportunities in the middle of the job ladder might be expected to have the greatest negative impact on minority workers. In fact, the share of black and Hispanic college graduates with poverty-level wages rose dramatically in this decade, from about 9 percent to just under 15 percent. If the unemployed and those who had stopped looking for work are included, the incidence of low earnings among college graduates rose from 14.6 percent to 21.4% for black men and from 11 percent to 19.4% for Hispanic men (Acs and Danziger, 1993).

2. Employment Trends: Are Opportunities for Low-Skill Work Collapsing?

A. Low Wage and Low Skill Shares of Employment, 1975-90

According to the skill mismatch story, the problem facing low skilled workers in the 1980's was that worker skills simply did not increase to meet the rising skill demands of jobs. The consequence was declining demand, low earnings, and rising unemployment and nonparticipation. This story assumes a close link between skills and wages. If fewer and fewer jobs require low skills, wages should fall but fewer jobs should be paying low wages (the presence

Furthermore, the increasing competition for lower skill jobs by the redundant college educated workforce will also tend to lower the wage of those with low educational attainment. A large part of the growth in the wage gap between college and high school degree holders was due to the decline in the earnings of the latter (cite).

of too many low-skilled workers should not affect the wages for higher skilled jobs since they are not substitutes for higher skilled workers). It seems reasonable to expect, therefore, that changes in the share of low-wage workers should roughly correspond to changes in the share of low-skill workers. To examine this proposition, I calculated the share of workers earning low wages and the share with low educational attainment for 1975 (the earliest year for which hourly earnings can be calculated from the Current Population Survey), 1979, 1984 and 1990.⁷ Low wages are defined as 1.5 times the poverty level for an urban family of three. Assuming 1750 hours of work (50 weeks, 35 hours), this "low-wage" threshold was an hourly wage of \$8.09 in 1988. Low skills were defined as educational attainment that does not go beyond high school. This is by no means an adequate measure of the skills required in the workplace (see Howell and Wolff, 1991a), but it does offer a convenient and familiar measure of cognitive skills. Since the purpose was to provide insight into current labor market conditions and to reduce the effect that older, less-educated workers might have on the results, only those in the first half of their careers (ages 16-39) were included in the analysis.

Figure 3 shows that employed workers with low educational attainment declined throughout the 15 year period, from 62.8% in 1975 to 55.5% in 1990. Although the technological change explanation would suggest that the greatest increase should have taken place in the second half of the 1980's when the demand for skills presumably accelerated and those without adequate skills dropped out of the labor market, the data indicate that this increase actually took place in the early 1980's. In sharp contrast, Figure 3 also shows that low wage workers increased from 50.6% to 55.8% of the workforce from 1975 to 1990, with the largest jump again occurring in the 1979-84 period.

Figures 4 and 5 distinguish these trends for the goods and service industries. These show that a declining share of low-skill workers and a rising share of low-wage workers characterize both industry groups. But there are two interesting differences. First, the pace of the restructuring - the percentage change from 1975-90 - was much more rapid in the goods than the service sector, both with respect to skills and earnings. Second, compared to the service

⁷Two of these years, 1975 and 1990, are recession years. Replacing these with 1976 and 1989 has no effect on the trends presented below.

industries, employment in the goods industries is characterized by far lower shares of low-wage workers in each of the four years (37-44% vs. 59-62%) and much higher shares of low-skill workers (73-64% vs. 56-51%).

At the industry level, the growth in low wage employment was the most pronounced in the goods industries. Of the 10 industries with greater than 20% increases in the low-wage share of total employment, 9 were goods producing. Also worth noting is that among industries with substantial declines in the low skill share of employment, many had large increases in low wage shares. For example, between 1975 and 1990 restructuring in the Stone, Clay, Glass and Primary Metals industry (which includes steel) resulted in a 9% decline in the share of low skill employment (from 77% to 70%) but a 76% increase in the low-wage share (from 23% to 40%). The communications industry saw its low-skill share decline by 33% (from 58% to 39%) and its low-wage share increase by 33% (from 22 to 29%). Even more dramatically, the automobile industry's low skill employment share declined by 6% (from 76% to 71%) but its low wage share grew by 142% (from 17% to 40%).⁸ Industries with high-wage, low-skill workforces radically restructured their workplaces in the 1980's by lowering wages and raising skill requirements - in short, moving in the direction of the typical service sector workplace. *The mismatch appears to be less one between skills demanded and skills supplied than between skills demanded and wages paid.*

The elimination of living-wage, low cognitive skill jobs has produced an extraordinarily rapid convergence of low-wage and low-skill employment shares among industries since 1979. Interestingly (at least for economists), in this respect the recent restructuring has made the labor market more like that described in the textbook model. The correlation between low-wage and low-skill shares of employment was insignificant in 1979 (.057) but rose to .255 in 1984 and .337 in 1990. As will be seen in the next section, a key avenue through which this convergence was achieved was by reducing the share of low skill workers with relatively high earnings.

⁸These results are conservative since temporary workers, whose share of employment greatly expanded in the 1980's, are defined as service sector workers and are not included in the data.

Finally, Figure 6 reports another notable effect of 1980's restructuring: the growth of that part of the workforce with relatively high educational attainment but earning very low wages. Workers paid less than 1.5 times the poverty-level wage with more than a high school education grew from 6.8 to 12 million workers between 1975 and 1990. This amounted to an increase in the low-wage/high-skill share of employment from 14.1 to 18.5 percent. Again, most of the change was accounted for by the 1979-84 period, in which three-quarters of the change occurred.

B. The Job Quality Structure

Another way to look at employment restructuring is by examining changes in the structure of jobs with a classification scheme that groups jobs on the basis of similarities in job quality. The most commonly used schemes use either industrial sectors (e.g., manufacturing, construction, and financial services) or occupational groups (e.g., professionals, managers, and operatives). But if the concern is with the effects of restructuring on the quality mix of jobs - on the relative numbers of "good" and "bad" jobs - we need an approach that incorporates both industry and occupation dimensions. That is because, first, there are vast differences in the quality of jobs in each industry, no matter how detailed its definition. And second, occupation groups include very different kinds of jobs depending upon the industry of employment. For example, compare the earnings of a legal secretary with a secretary employed in, say, a private university. Or compare the pay of a truck driver for a local furniture store with a driver for the U.S. Postal Service.

A better approach is to define jobs by both occupation and industry, and then to group these occupation-industry cells into a small number of categories based on a number of accepted indicators of job quality. This would offer the advantages of both simplicity (a small number of job groups) and usefulness (job groups that are relatively similar in terms of quality). Using a statistical technique called cluster analysis, Maury Gittleman and I have done this (Gittleman and Howell, 1993). We grouped 621 jobs (94% of the nonagricultural

workforce) on the basis of 17 measures of job quality⁹ and found that the structure of jobs could be characterized in three tiers, or "segments," each with two component "contours." Each of these job contours employed between 11 and 21 percent of total employment in 1979.

The **Independent Primary** segment consists of two subsets of jobs distinguished primarily by whether the employer is the public sector. The *Private Independent Primary (I-P)* contour is characterized by high earnings, high shares of workers with health and pension benefits, high cognitive skill levels, and full-time private sector jobs. These are almost exclusively professional, managerial, and high-wage sales jobs. Jobs in the *Public I-P* contour were similar in most respects, but workers in these jobs were employed almost exclusively in the public sector. Examples are teachers, police, firefighters, postal workers, and public sector managers and administrators.

The **Subordinate Primary** segment also consists of two contours, the *Routine White-Collar* and the *High-Wage Blue-Collar*. The white-collar job group pays moderate wages, requires moderate cognitive skill levels but demands very low strength and other physical demands. Most of the workforce is female. Examples of these jobs are nurses, health technicians, and full-time clerical workers. The *High-Wage Blue-Collar* contour is made up moderate/high wage, low cognitive skill jobs in which high shares of workers have health and pension benefits, are unionized, and do tasks requiring substantial strength and other physical demands (e.g., truck drivers, assemblers, and machine operatives in high-wage industries).

The **Secondary** segment includes the *Low-Wage Blue-Collar* and *Contingent* contours. Compared to the *High-Wage Blue Collar* contour, workers in *Low-Wage Blue-Collar* jobs earn much less, are less likely to be union members or to have employer paid health and pension benefits, require lower cognitive skills, and work at tasks requiring higher strength and other physical demands. Typical of these jobs are machine operatives and laborers in various low-wage industries, carpenters and painters in construction, and cooks and miscellaneous food occupations in retail trade. The *Contingent* contour consists of jobs that pay poverty-level wages, are the least likely to provide health and pension benefits, and have the

⁹Demographic characteristics like gender, race, age, and marital status were not employed in the cluster analysis.

highest shares of workers employed part-time and part-year. At the same time, average educational levels are substantially higher than in the two blue-collar contours. Examples are cashiers and sales occupations in retail trade, child care workers and household workers.

These six contours were defined using data for 1979 (primarily from the 1980 Census). Earnings ranged from \$17,400 in the *Private I-P* contour, where 86 percent worked full-time, to \$4,700 in the *Contingent* contour, where only 37 percent were full-time. Despite educational attainment that was almost a year and a half greater (12.8 compared to 11.4), the average hourly wage in the *Routine White-Collar* contour was just 70 percent of the *High-Wage Blue-Collar* wage (\$5.24, compared to \$7.44). Not surprisingly, 75% of *Routine White-Collar* job holders were female, compared to just 15% of *High-Wage Blue-Collar* employees. Both unionization and health insurance coverage were also highest in the *High-Wage Blue-Collar* contour.

C. Employment Restructuring in the 1980's

Using this classification scheme, we find a dramatic restructuring of employment since 1973, with most of the change concentrated in the 1979-83 period. Figure 7 shows that the subordinate primary segment declined by 4 percentage points between 1979 and 1990 (almost all of which was accounted for by the *High-Wage Blue-Collar* contour), while the independent primary segment has grown rapidly since 1973, rising from about 25 to 32 percent of the workforce (accounted for almost entirely by the *Private I-P* contour). In contrast employment in the secondary segment has remained virtually unchanged between 1979 and 1990. In fact, unlike the 1979-83 period, there was virtually no change in employment shares between 1987 and 1990. Since the transformation to "high performance" workplaces was presumably more prevalent in the later period, the timing of these changes lends little support to the skill mismatch thesis that technological advances have led to a drop in low-skill job opportunities on a scale large enough to cause a major restructuring of the wage distribution.

While secondary jobs have hardly declined as a share of total employment in the last decade, they did fall sharply in quality - as did jobs in the *High-Wage Blue-Collar* contour. Real hourly earnings in the *Contingent*, *Low-Wage Blue-Collar* and *High-Wage Blue-Collar*

contours all dropped substantially (10-13%) between 1979 and 1990. Real earnings increased slightly in the *Routine White-Collar* contour and remained about the same in the two independent primary contours.

Declines in quality can be seen in other indicators as well. The share of workers with employer provided health insurance fell in all six contours, but the greatest declines were in the blue-collar and contingent contours: coverage in the *High-Wage Blue-Collar* contour fell from 83.6% to 72.8%, while coverage declined from 56% to 42% in the *Low-Wage Blue-Collar* contour and from 33% to 25% in the *Contingent* contour. At the same time, involuntary part-time employment, the share of workers who work part-time but want full-time jobs, increased in these three low-skill contours (respectively, from 2.5 to 2.9%, 4.9 to 7.5%, and 4.5 to 9.6%) but remained essentially unchanged in the other three.

Who was hurt most by these trends? On the basis of earnings, health insurance coverage and involuntary part-time employment, the greatest declines in job quality in the 1980's took place in the *High-Wage Blue-Collar*, *Low-Wage Blue-Collar*, and *Contingent* contours. Compared to half of all white male workers, 73% of all black male workers and 75% of Hispanic male workers were employed in these three contours in 1990. These contours also employed 58 percent of all black female workers and 62 percent of all Hispanic female workers, compared to under 42% of all white female employees.

These results clearly indicate that the employment restructuring that took place in the 1980's had two main features. First, as Bluestone and Harrison (1986) and others argued in the early 1980's, there was a sharp decline in the middle of the job structure for men. And second, the quality of subordinate primary and secondary jobs fell in both absolute and relative terms throughout this decade. Both of these developments underlie the growth of earnings inequality documented by Levy and Murnane (1992): compared to 1979, in 1987 larger shares of male workers were earning less than \$20,000 and more than \$40,000, but a far smaller share earned between \$20,000 and \$40,000.

D. Projected Trends in the 1990's

Are the 1990's likely to show similar trends? To answer this question I turned to

employment projections made by the U.S. Department of Labor's Bureau of Labor Statistics. The standard source for these projections, the Bureau makes use of a large statistical model that includes the results of numerous case studies of specific occupations and industries to estimate future employment trends by occupation (U.S. Department of Labor, 1990). Although these projections have tended to be conservative since they rely heavily on the extrapolation of past trends, they offer the best available comprehensive estimates of the kinds of changes in the mix of jobs we can expect in the future.

Tables 1 and 2 present average educational attainment, earnings and the female share of employment for large occupations projected to either grow rapidly or decline in number by the year 2000. The first column of Table 1 shows that rapidly expanding occupations are by no means limited to those with high educational attainment: 7 of the 18 occupations have average education levels below the economy-wide workforce average (13.1 years). And as the third column indicates, all seven had average annual earnings that were less than \$10,000 (the poverty line for an urban family of three was \$9,436). It is also worth noting that the female share of employment was high in all seven. Indeed, in four of these large, rapidly growing occupations, the female share ranged from 82 to 96 percent. These results suggest a bright future for many low-skill, low-wage, traditionally female occupations.

Table 2 indicates that all of the largest occupations expected to show absolute declines in employment require relatively low educational attainment. But the Table also shows that 4 of the 10 declining occupations had average earnings that ranged from \$15,082 - \$20,908. Three of these were predominantly male occupations (Metal Working Machine Operators, Welders and Cutters, and Industrial Equipment Operators).

These results were limited to large occupations that are projected to grow and decline the most. What happens when all jobs are taken into account? Since the BLS projections are not available for the occupation-industry cells we used to generate our contours, I could not project employment growth by contour. As an alternative, I grouped the 227 occupations¹⁰ that were both appear in the BLS projections and match those in the Current Population Survey into another six-category scheme that distinguishes poverty, low, moderate and high-

¹⁰These cover about 92 percent of total employment.

wage occupations, and subdivides the low and moderate-wage groups by education level (for the earnings and educational attainment criteria used for defining these groups, see the footnote to Table 3).

The results are shown in Table 3 which reports that the two highest wage, highest skill occupation groups (5 and 6), accounted for slightly more than one-third of total employment in 1988 and are predicted to grow the most rapidly (21% and 24%). Workers in these jobs had educational attainment levels that were two years greater than average. The Table also reports, however, that the average earnings of three of the six wage-education groups were near to or below the poverty wage (less than 1.5 times the poverty line for a family of three). These 83 occupations also accounted for more than a third (36.4%) of all employment in 1988. According to the BLS projections, employment growth in two of these three groups - the *Poverty Wage* and the *Low-Wage High-Education* groups (just under 30% of total employment) - will be in the neighborhood of the economy-wide average of 17.4%. The second occupation group, *Low-Wage Low-Education*, is projected to have by far the slowest growth in employment (8.8 percent), but these occupations consist of just 7 percent of total employment.

While *Poverty-Wage* and *Low-Wage High Education* occupations are expected to grow at about average rates and the two high education job groups will expand at rates 4-7 percentage points above average, the 63 occupations that pay living wages but require relatively low educational levels and comprise 28% of the workforce are projected to grow by just 13.1%, 4.3 points below average. Although these differences will change the distribution of employment among the six groups only marginally, they do indicate that the labor market can be expected to continue to exhibit a "declining middle." The central message from these employment projections is, as the evidence from the 1980's also showed, that the skill distribution does not appear to be undergoing a radical shift as a result of employment restructuring among occupations. The three occupation groups in which workers had average educational attainment levels below that of a high school degree (12 years) consisted of about 52 % of all workers in 1988; BLS projections suggest that these jobs will still employ close to half of all workers in the year 2000.

3. Concluding Remarks: An "Institutionalist" Story

An enormous research effort has been made to try to understand the severe deterioration in the earnings status of low-skilled workers in the 1980's. Surveying this literature, Levy and Murnane (1992) concluded that we do not yet have the data to provide an entirely satisfactory answer. But we do know that it was primarily changes in wage rates within industry and education groups that led to the rise in inequality and that the greatest declines in wages took place among those with the least educational attainment - although as noted above, it should be remembered that the incidence of low earnings grew substantially among black and Hispanic male college graduates as well. Despite the continuing popularity of the technology-induced skill mismatch explanation for the rising incidence of low earnings, the evidence presented in Sections 1 and 2 strongly supports Levy and Murnane's conclusion that there is little solid empirical support for it.

So why did the share of low-wage jobs expand? Part of the answer is that many of these jobs have traditionally been located in the services and employment in many of these industries expanded in the 1980's. But like the decline in the demand for low-skill manual workers, the expansion of service sector employment was not unique to the last decade. More importantly, an "institutionalist" explanation for the declining relative earnings of low-skill workers would focus on the adoption of new human resource policies by private sector firms faced with increasingly competitive product markets, an increasing supply of workers competing for a low-skill jobs, and strongly pro-business Federal, State and Local governments.

In developing a competitive strategy, it should be recognized that firms are not limited to a choice between a low-skill, low-wage and a high-skill, high-wage workplace - the so-called "low-road" and "high-road" approaches. Rather, the ideal outcome is a highly skilled, reliable workforce willing to accept low wages. This is particularly important in a period in which markets are less protected than ever (so labor costs are crucial) and the production process requires more flexibility to adapt products to consumer demands and relies more heavily on computer-based technologies (tending to require higher literacy).

To implement a high-skill/low-wage human resource strategy, large integrated (high wage) firms have downsized, relying more heavily on low-wage suppliers. Advances in

telecommunications and transportation have also facilitated relocation of lower-skilled operations to low-wage sites, leaving behind a core of permanent, relatively skilled employees supplemented (often heavily) by part-time and temporary workers. Central to this part of the strategy has been an uncompromising attack on the "middle" - typically those blue-collar workers with relatively low cognitive skills taking home middle-class paychecks. A good example is the demand for large wage concessions by unionized meatpacking firms in the midwest in the late 1980's - a demand that was not linked to changes in skill requirements. According to spokespersons of Pratt and Whitney, the firm's decision to relocate as many as 9,000 high paying production jobs from a high skill state (Connecticut) to lower skill states (Maine and Georgia) was to reduce labor costs. Again, lower wages result, but not as a response to new workplace technologies (New York Times, April 15, 1993: p. A1). Another recent New York Times report (July 18, 1993, p.1) documents the substantial demand for extremely low-skilled labor in the 1980's in Saipan and other U.S. owned islands in the South Pacific where some 20,000 workers, recruited primarily from mainland China, typically put in six days a week for half the minimum wage making American brand-name clothes. As this demand for low-skilled workers willing to accept poverty-level wages expanded in these offshore U.S territories in the 1980s, low-skill but living-wage garment jobs decreased in the continental United States.

The consequence, as Bennett Harrison (1993) has described it, is that the job structure is being transformed from one with a diamond shape, with lots of good, relatively low-skilled jobs, to one with an hourglass shape, in which only the best and worst jobs are expanding. Levy and Murnane's survey confirms this conclusion. In their words, "the male earnings distribution has 'hollowed out,' leaving larger percentages of workers at the top and bottom of the distribution, and a smaller percentage in the middle" (1992: 1371). The restructuring of the 1980's was much less about an across-the-board decline in the demand for low cognitive skill workers than about a declining demand for blue-collar workers earning living wages.

This evidence suggests that low labor cost employer strategies, not declining demand due to the rapid diffusion of new technology, is the main source of the rising incidence of low earnings. In addition, there is no obvious reason why a declining demand for low-skill workers, even if it could be shown to be substantially greater than in previous decades, would

explain the growth of within-group (defined by industry, gender, education and experience level) inequality. To explain both the expansion of the share of poverty-wage workers and the rise in within-group inequality it is essential to recognize the central role of corporate human resource strategies. The inequality puzzle seems the most difficult; the answer may lie in the breakdown of "wage norms" within firms (as internal labor markets are opened up to external competition), within industries (as increasing competition causes differences among firms to become a more critical factor in wage outcomes) and among communities (as transportation and telecommunications facilitate the relocation of some, but not all, firms to lower wage areas). In short, the "law of one price" may have been undermined, not promoted, by the recent wage restructuring. In any case, it seems wise to heed the words of Levy and Murnane (1992: 1374) who conclude their survey of recent earnings research with the observation that "The decisions firms make are difficult to understand, but they will play a large role in determining the distribution of earned income in the years ahead."

Part of the decline in bargaining power that contributed to the wage collapse can be traced to the supply side. As the middle of the earnings structure narrowed, low-skill workers have crowded into a pool of "secondary" jobs that remained a fairly constant share of total jobs throughout the 1980's. This crowding has almost certainly tended to lower the wages of what were already the worst jobs in the labor market. According to a recent Department of Labor study (Herz, 1991), more than 4.3 million workers were displaced during the boom years of 1985-89.¹¹ Only 72 percent had been re-employed by January 1990 and of these, about 10 percent worked part-time. Among those re-employed full-time, about 40 percent earned less in current dollars than on their previous job. Not surprisingly, those least successful in the labor market after displacement were high-wage blue-collar men. According to Herz (1991:7) "Six of every 10 displaced workers in this industry (transportation equipment) earned less on their new jobs than on their old one, and more than half of this group suffered declines of 20 percent or more."

The downward effect of a "declining middle" on the wages at the bottom of the wage

¹¹ The study defines displacement as "job loss due to plant closings or moves, slack work, or the abolishment of their positions or shifts."

distribution can also be inferred from research by Robert Topel (1993:113). Between 1979 and 1988, he finds that "nearly one-third of the unemployed had predisplacement wages above the 60th percentile, and only 14 percent are from the bottom decile.... Among displaced workers with prior earnings from the upper four deciles, current wages are about half of their predisplacement level." Defining the unskilled as those with low wages, Topel (p. 110) interprets his results as showing that "Many of the 'unskilled' who are unemployed or out of the labor force appear to have been high-wage workers whose specialized skills have become obsolete." High-wage blue-collar workers were certainly hard hit by the 1980's, but there is no evidence that these were workers with specialized skills or that their skills become obsolete at a rate that was substantially greater than in earlier decades.

Immigration patterns compounded the downward effect that displaced high-wage workers had on the wage rates of low cognitive skill jobs. There was an unprecedented increase in the flow of low skill foreign workers into the U.S. in the 1980's, both legal and illegal. According to Borjas, Freeman and Katz (1992:214-15) the combination of rising imports and growing numbers of low-skilled foreign workers had substantial negative effects on the relative earnings of native low-skilled workers. The authors concluded that "We estimate that between 30% and 50% of the ... decline in the relative weekly wage of high school dropouts from 1980 to 1988 can be attributed to trade and immigration flows." Case study evidence supports this finding. In his study of the Los Angeles restaurant and hotel industry, Waldinger (1992) concluded that "the story of black displacement in restaurants and hotels can be traced not to skill upgrading, but rather to competition with a rapidly growing immigrant population." Similarly, a General Accounting Office study cited by Jack Miles (Atlantic, October 1992) found that "Janitorial firms serving downtown Low Angeles have almost entirely replaced their unionized black workforce with non-unionized immigrants." Again, it appears to have been labor costs, not skill restructuring, that explains this result.

Government policies since the mid 1970's have also greatly facilitated the adoption of low-wage human resource strategies by the private sector - through deregulation of the transportation and communication industries, hostility towards labor unions, a minimum wage that increased from \$2.90 in 1979 to just \$3.35 in 1989, and an evident lack of interest (quite unlike our major competitors) in either regulating layoff and relocation decisions of large

establishments or in limiting the entry of low-skilled foreign workers. To cite just one example, consider the effect of the federal government's foreign trade policies on the relative bargaining power of workers. According to Shaiken (1993:63), a recent Wall Street Journal poll found that "one-quarter of almost 500 corporate executives polled admitted that they are either 'very likely' or 'somewhat likely' to use NAFTA as a bargaining chip to hold down wages. About 40 percent indicated that they might move at least some production to Mexico within the next several years." It seems likely that this response by employers had little to do with the widely heralded (by economists) rise in the demand for skill, but a lot to do with wage rates - and is the kind of response that can help explain the dramatic rise in the share of workers with poverty-level earnings. It should also be noted that state governments have also helped facilitate a low-wage strategy; in their increasingly desperate pursuit of manufacturing jobs, state and local government officials have had a strong incentive to pursue policies that keep wages "competitive" and union membership low.

The central role played by labor market institutions, specifically the real value of the minimum wage and unionization, is underlined by the recent comparative study of wage inequality trends in Canada and the U.S. in the 1980's by DiNardo and Lemieux. Despite similar labor markets, wage inequality grew rapidly in the U.S. but not in Canada. Dinardo and Lemieux find that "during this period, union density fell precipitously in the United States but declined very little in Canada. Similarly, the real minimum wage declined by 23 percent in the United States but by only 12 percent in Canada...we find that unions and the minimum wage accounted for 80 percent of the difference in the growth of inequality in the two countries." Confirming Katz, Loveman and Blanchflower's (1993) conclusion that unions and the minimum wage helped explain the different experiences of France (low inequality growth) and Great Britain (increasing wage inequality) during this period, the authors conclude that their findings underline "the enormous, though neglected, role of labor market institutions in explaining the very different changes in wage inequality across countries."

Another important, but neglected, area of research, concerns the impact of government social policy on the wage distribution. The U.S. continues to rely heavily on employers to provide health insurance, pensions, child care, and other fundamental benefits - benefits that appear as labor costs to employers. These costs are assumed by the public sector in most

other developed countries. As the costs of benefits rise, our "privatized" benefits system encourages employers to substitute part-time and temporary low-wage jobs, increasing both the share of low earners and wage inequality.

Few will, or should, oppose the Labor Department's "get smart" policies for workers, but the reality is that changes in the ability of workers to provide the skills needed in technologically advanced workplaces had little to do with the startling growth in poverty-wage jobs, the drop in real earnings, and the growth of earnings inequality in the 1980's. We need to improve our education and training system, but making workers smarter will not, by itself, have much impact on the distribution of earnings - certainly not in the next decade. Besides, most jobs will continue to require less than a college degree, and a labor market that increasingly offers poverty-wage jobs to these workers provides them with little incentive to invest in education and training, no matter how well we design and implement the programs. Equally important, low wage employment strategies and high levels of job insecurity are an unlikely recipe for developing a competitive economy of high performance workplaces.

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Table 1: Characteristics of High Growth Occupations With More Than 400,000 Workers in 1988*

Occupation	Years of Education	Hourly Wage	Annual Income	Share Female
Electrical Engineers	16.0	20.17	40,623	8.3
Computer Systems Analysts	15.5	17.04	33,307	35.2
Social Scientists	16.8	13.65	25,234	56.2
Lawyers and Judges	17.7	16.58	38,439	23.2
Teachers, Pre-k & K	15.1	8.04	12,166	98.4
Physicians	17.7	17.53	46,834	17.0
Registered Nurses	15.4	14.01	24,406	92.7
Designers	14.5	8.85	18,098	47.5
Licensed Practical Nurses	13.1	8.52	14,215	97.5
Engineering Technicians	13.7	12.70	26,775	18.5
Computer Programmers	15.3	14.7	29,860	40.6
Computer Eqt Operators	13.4	8.98	16,931	65.3
Receptionists and Info Clerks	13.0	6.79	8,733	94.8
Waiters and Waitresses	12.6	6.13	6,664	82.5
Cooks	11.5	5.28	6,954	48.0
Misc. Food Prep Occupations	11.3	4.87	4,630	44.5
Nurses Aides and Orderlies	12.0	6.27	9,829	90.5
Child Care, except pvt H-H	12.4	2.77	2,197	95.9
Groundskeepers & Gardners	10.7	4.74	6,008	63.1

*Occupations projected by BLS to increase by at least 24% between 1988 and 2000.

Table 2: Characteristics of Declining Occupations With More Than 400,000 Employees in 1988*

Occupation	Years of Education	Hourly Wage	Annual Income	Share Female
Typists	13.1	7.13	10,126	95.8
Data-entry Keyers	12.9	7.96	13,734	95.8
Child Care Workers, pvt HH	11.3	2.86	2,183	97.4
Cleaners & Servants, pvt HH	10.5	5.27	4,598	96.4
Farm Workers	10.3	4.04	5,563	26.4
Metal working Machine Oper's	11.6	10.0	19,908	18.7
Textile & App'l Mach. Oper's	10.4	5.53	9,644	79.3
Assemblers	11.2	8.22	15,082	48.2
Welders and Cutters	11.6	11.02	20,908	7.1
Industrial Equipment Operators	11.1	9.82	19,450	7.3

*Occupations projected by BLS to decline between 1988 and 2000.

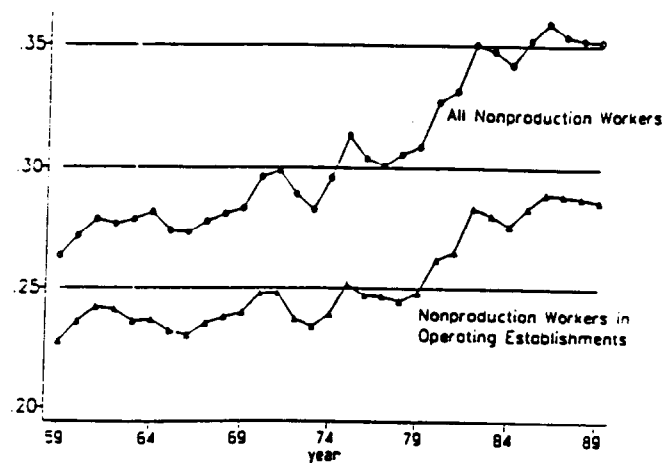
**Table 3: Projected Employment Growth in the 1990's
For Occupation Groups Defined by Earnings and
Education Levels in 1988**

Occ Groups	Occs	Empl Share 1988	Hourly Wage 1988	Annual Earnings 1988	Educ Level 1989	Share Female 1989	Growth 1988 - 2000
1. Poverty	39	16.7	5.20	6,159	11.9	62.8	17.6
2. Low-Wage/ Low Educ'n	27	7.1	6.76	11,268	11.7	56.4	8.8
3. Low-Wage/ High Educ'n	17	12.6	7.40	11,787	13.2	81.3	16.7
4. Mod-Wage/ Low Educ'n	63	28.0	9.10	17,080	11.8	20.8	13.1
5. Mod-Wage/ High Educ'n	52	19.6	11.73	22,398	15.0	59.1	21.3
6. High Wage	29	16.0	15.09	32,935	14.8	29.7	24.4
Total	227	100	9.54	17,751	13.1	46.9	17.4

Source: March 1989 Current Population Survey and "Outlook 2000" Bulletin 2352, U.S. Department of Labor, April 1990, pp. 50-58.

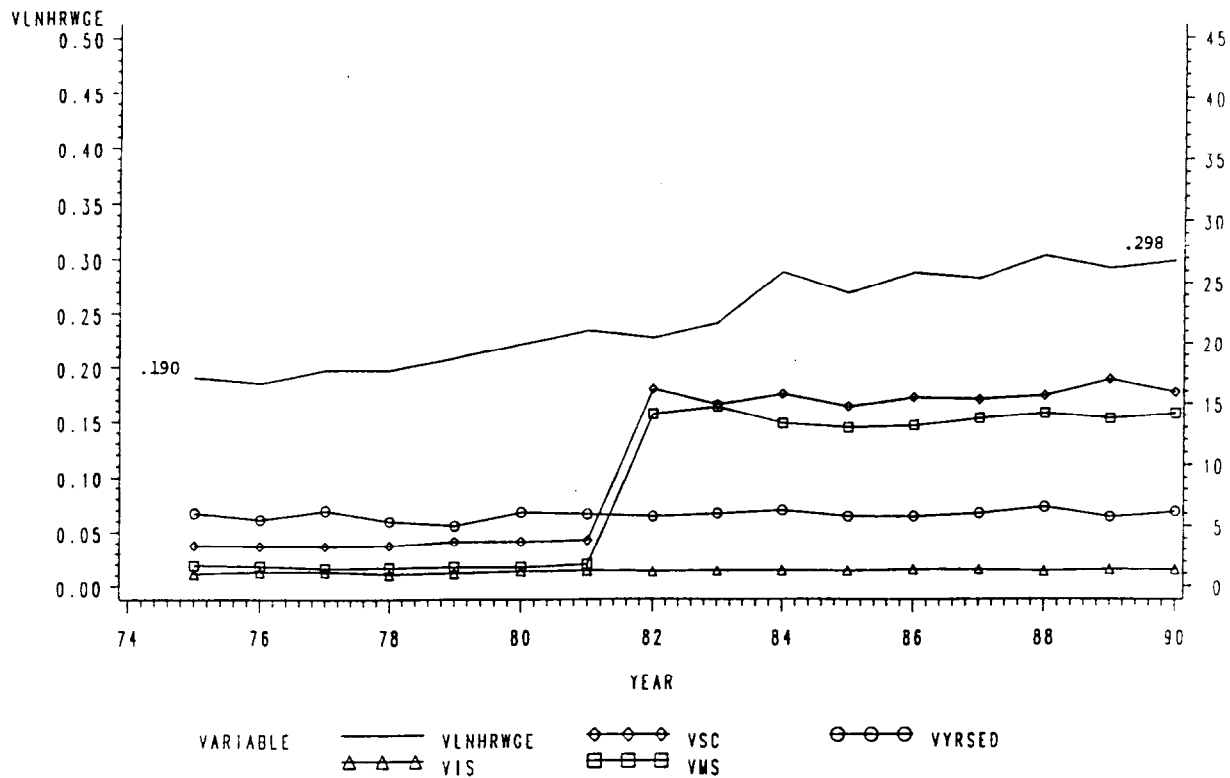
Included in the Table are individuals who were between 16 and 65 in 1989 with wage and salary work experience in 1988. The 227 occupations were those in the CPS that matched occupations used by BLS. Excluded are farmers and a variety of small occupations (less than 25,000 workers) that BLS does not project. Occupation groups were defined on the basis of average annual earnings and educational attainment (highest grade attended). Poverty earnings are defined as less than \$9,436, the poverty line for a nonfarm family of 3 in 1988. Low earnings are defined as \$9,436 - \$14,154 (1.5 times the poverty line); moderate earnings: \$14,154 - \$28,308 (twice the poverty line); high earnings: greater than \$28,308. Low education and high education occupations are those whose average attainment is below and above the workforce average in 1989, 13.1.

Figure 1: Non-Production Workers Share in Total Employment



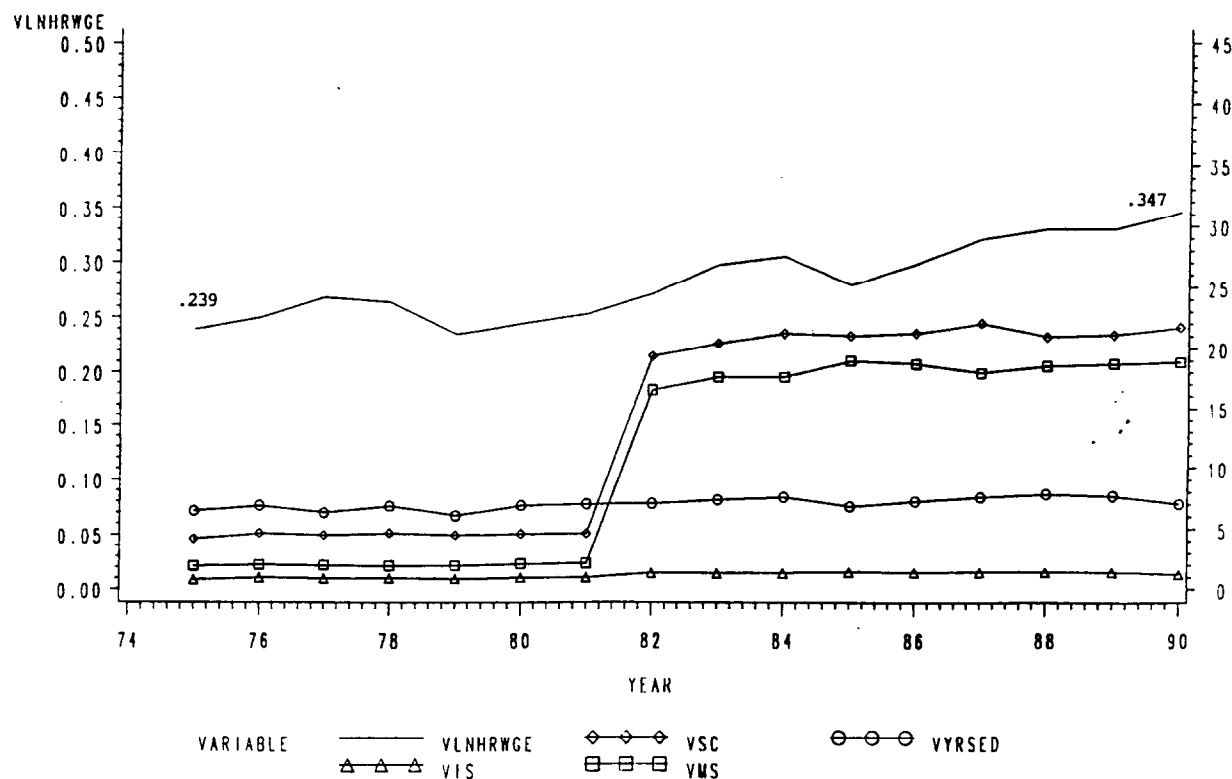
Source: Berman, Bound and Griliches (1993)

**Figure 2a: Variances of Earnings, Education, and Skill Variables
Hourly Earnings for All Wage & Salary Earners, 1975-1990 (Autos)
IND=8**



Source: Wieler (1993)

**Figure 2b: Variances of Earnings, Education, and Skill Variables
Hourly Earnings for All Wage & Salary Earners, 1975-1990 (Electrical Equipment)
IND=7**



**Figure 2c: Variances of Earnings, Education, and Skill Variables
Hourly Earnings for All Wage & Salary Earners, 1975-1990 (Business Services)
IND=25**

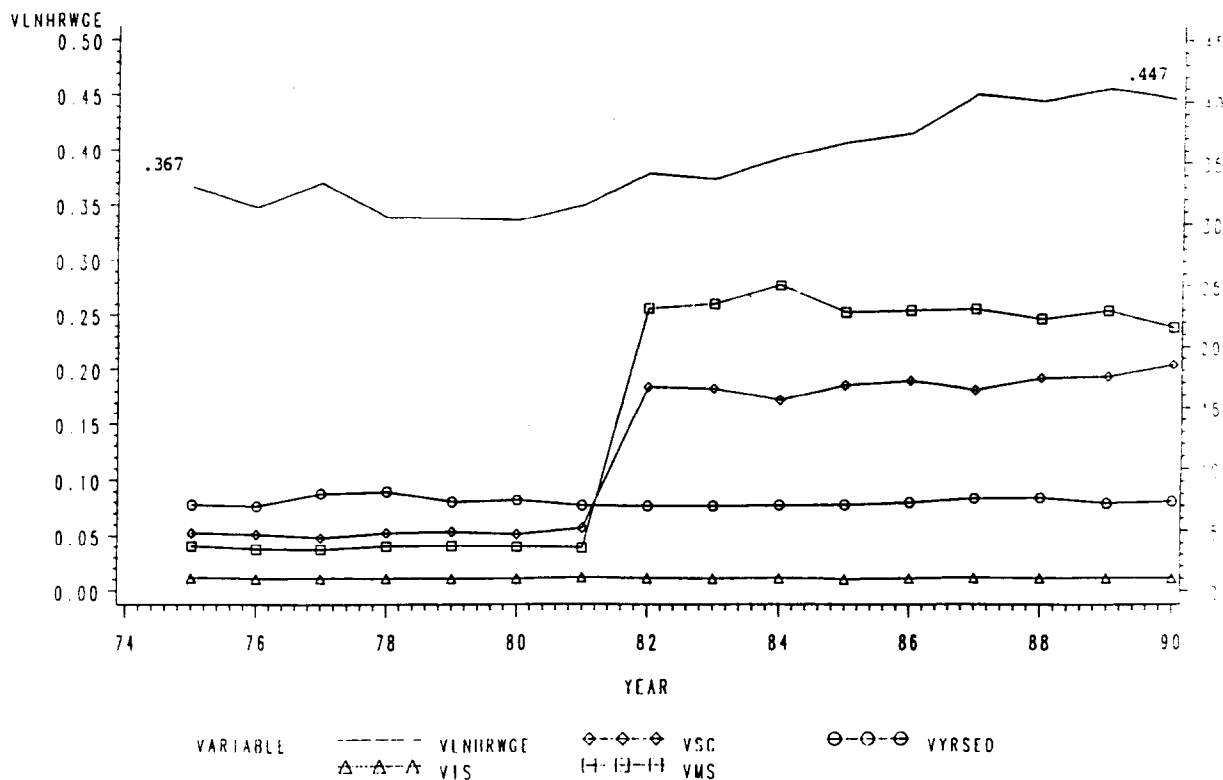
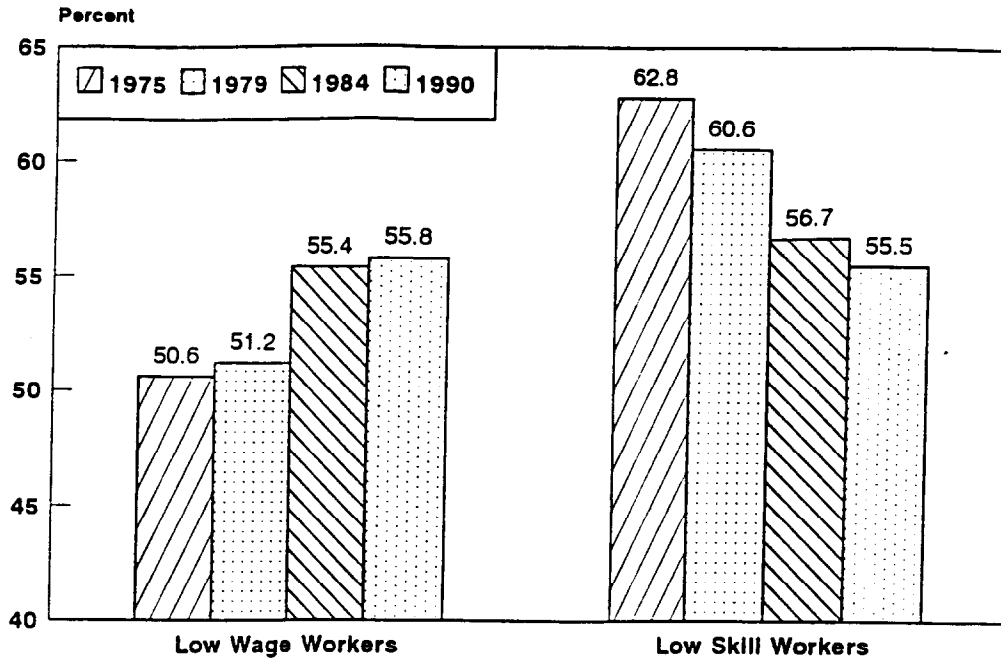
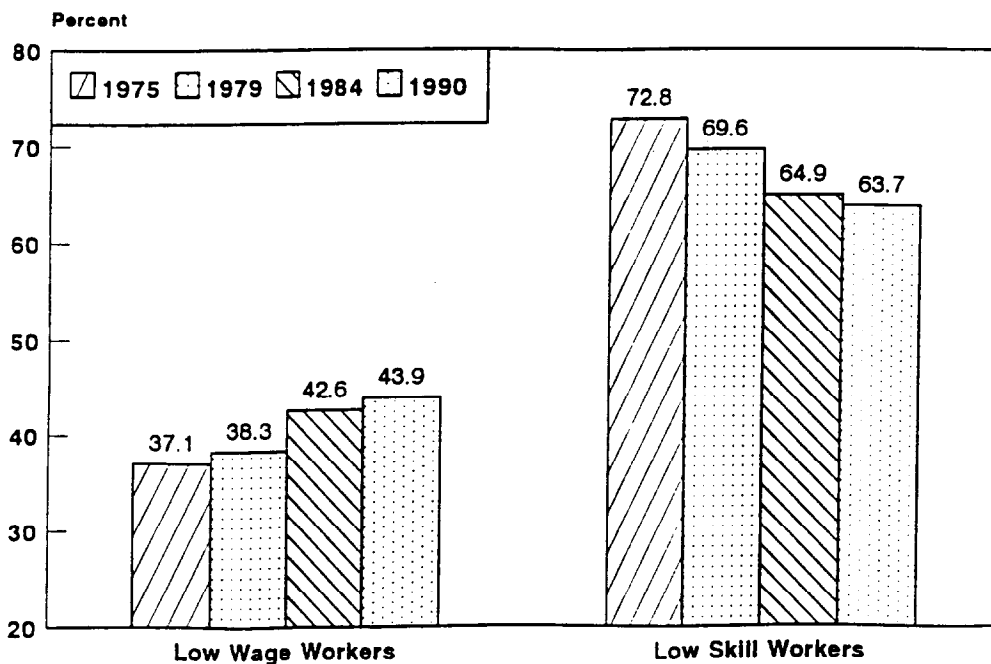


Figure 3: Low Wage and Low Skill Shares of Total Employment, 1975-90



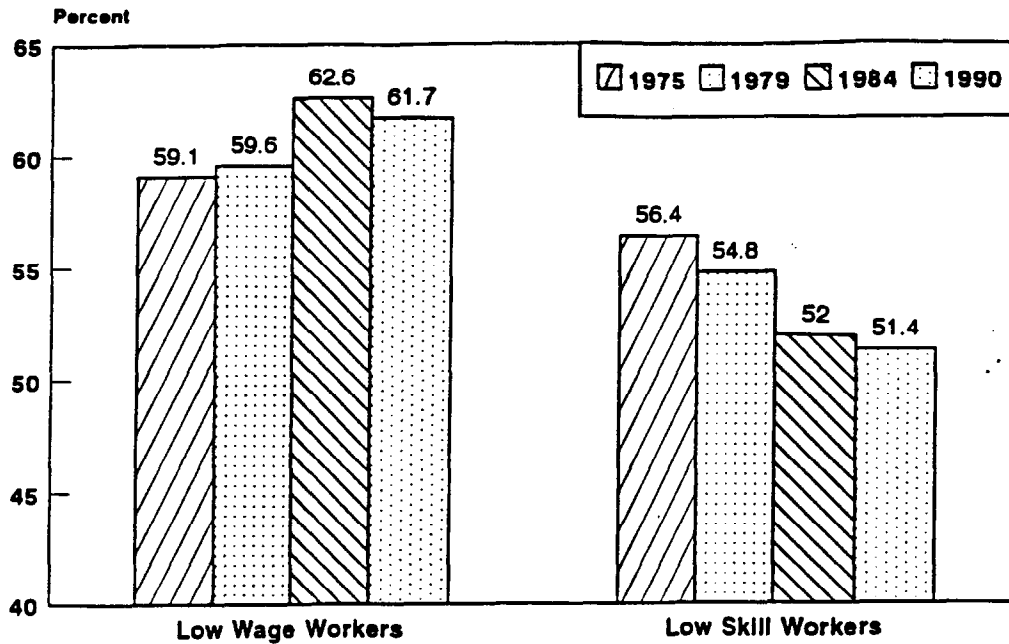
Source: March CPS. Includes ages 16-39.
 Low Wage: $<1.5 \times$ poverty wage.
 Low Skill: 12 years of Educ'n or less.

Figure 4: Low Wage and Low Skill Shares of Goods Sector Employment, 1975-90



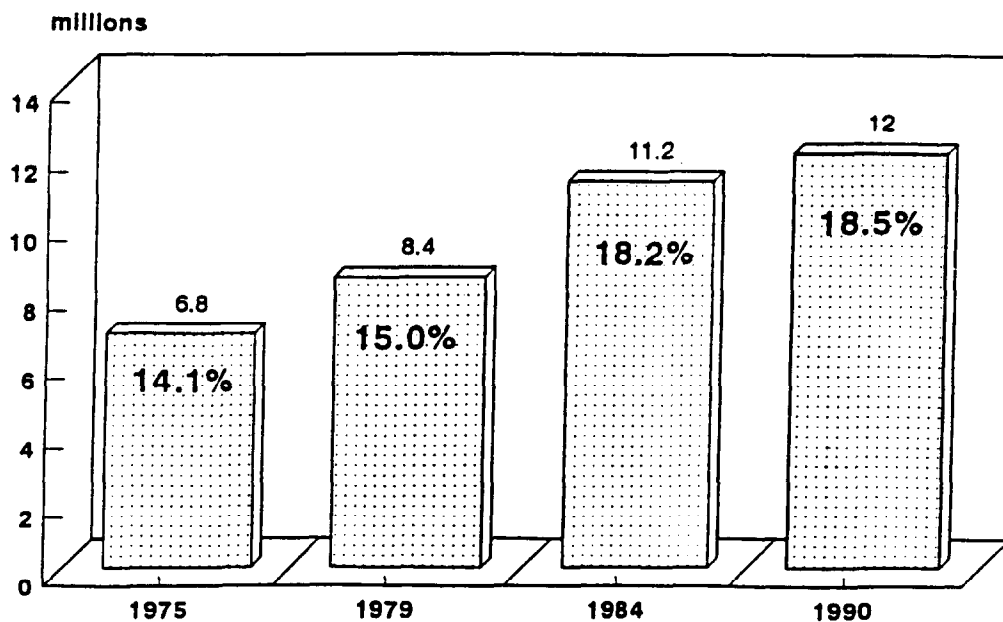
Source: March CPS. Includes ages 16-39.
 Low Wage: $<1.5 \times$ poverty wage
 Low Skill: 12 years of educ'n or less.

Figure 5: Low Wage and Low Skill Shares of Service Sector Employment, 1975-90



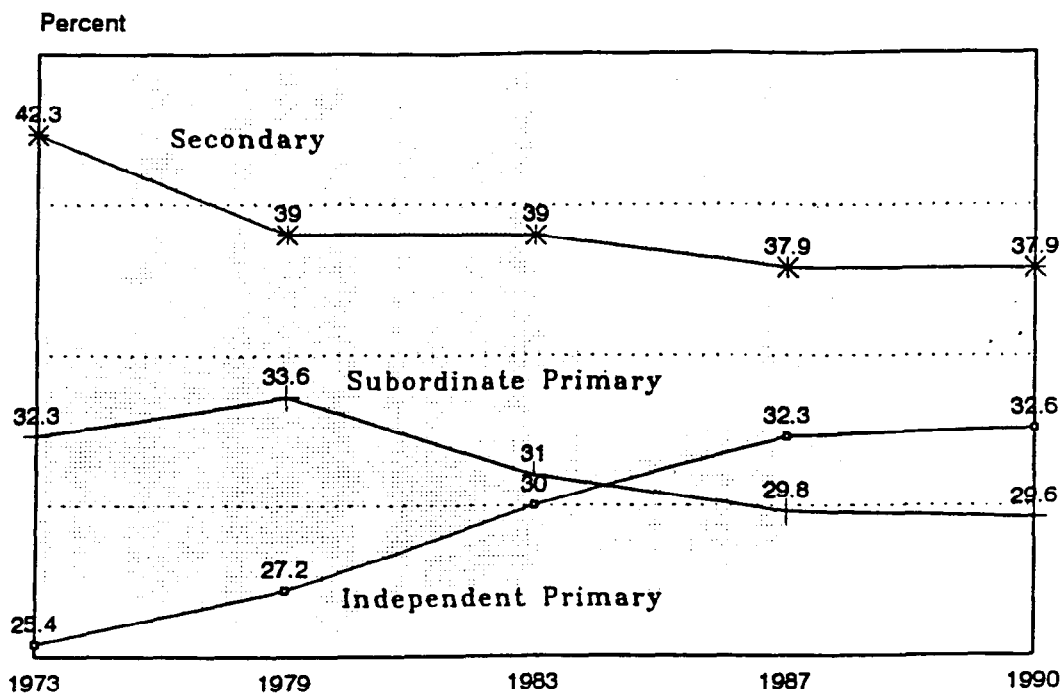
Source: March CPS. Includes ages 16-39.
 Low wage: $< 1.5 \times$ poverty wage.
 Low skill: 12 years of Educ'n or less.

Figure 6: The Number and Share of Low Wage Workers With More Than a High School Degree, 1975-90



Source: March CPS. Includes ages 16-39 with work experience. Low wages are those less than $1.5 \times$ poverty wage.

**Figure 7: The Distribution of Employment
by Job Segment: 1973-90**



Source: Current Population Survey