the State of Working America 1996-97

Lawrence Mishel

Jared Bernstein

John Schmitt

ECONOMIC POLICY INSTITUTE

VISIT EPINET.ORG

The Economic Policy Institute's Web site contains current analysis of issues addressed in this book. There is also a section that provides more comprehensive information on some of the income, wage, and poverty data series used in *The State of Working America*. These data series are updated with the latest information.

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TABLE 3.16

Change in Private-Sector Employer-Provided Pension Coverage, 1979-93

Group*	Pension Coverage (%) 1979	1988	1993	Change 1979-93
All Workers	48%	44%	45%	-3
Gender				
Men	55%	48%	47%	-8
Women	37	39	42	5
Race				
White	50%	47%	47%	-3
Black	45	39	42	-3
Hispanic	35	28	29	-6
Education				
Less Than High School	41%	31%	25%	-16
High School	49	44	44	-5
Some College	49	44	46	-3
College	56	54	55	-1
More Than College	60	58	59	-1
Wage Fifth				
Lowest	18%	14%	13%	-5
Second	35	33	34	-1
Middle	51	45	51	0
Fourth	68	59	61	-7
Top	76	69	72	-4

* Private-sector wage and salary workers age 18-24, with at least 20 weekly hours and 26 weeks of work.

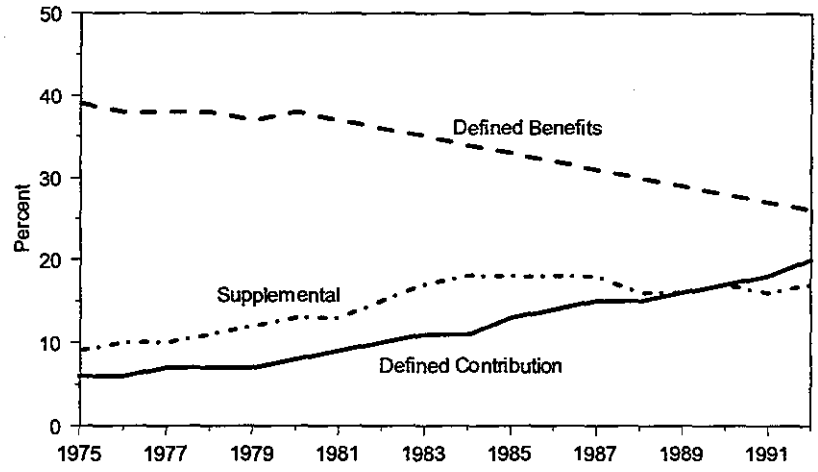
Source: Department of Labor tabulations of CPS data.

college graduates and those with less than a college degree; it dropped off most among those at the lowest education levels. The pattern of decline in pension coverage by wage level shows coverage dropping most for the lowest and highest wage groups and some stability among the second and middle fifths. Perhaps most important, lower-wage workers are unlikely to have jobs with employer-provided pension plans, a situation in which more than half the workforce finds itself.

The decline in the quality of pension plans is portrayed in **Figure 3G**. Defined benefit plans guarantee a worker a fixed payment in retirement based on

FIGURE 3G

Shares of Workers in Pension Plans, by Type, 1975-92



Source: Department of Labor (1996).

pre-retirement wages and years of service and are generally considered the best plans from a worker's perspective. Unfortunately, there has been a significant erosion in the share of the workforce covered by defined benefit plans. A larger share of workers are now covered by defined contribution plans, in which employers make contributions (to which employees sometimes can add) each year. With this type of plan, a worker's retirement income depends on his or her success in investing these funds, and investment risks are borne by the employee rather than the employer.

Dimensions of Inequality

In this section we shift the discussion from a presentation of wage and benefit trends overall, and for subgroups, to an examination of explanations for the pattern of recent wage growth. The items to be explained include stagnant average wages since 1973 and the dramatic growth in wage inequality in the 1980s and early 1990s. More specifically, it is important to understand

both the average performance of wage growth and why particular groups fared well or poorly.

The data presented above have shown the stagnation of wages and overall compensation over the last 20 years. **Table 3.17** presents indicators of the variety of dimensions (excluding race and gender differentials) of the wage structure that have grown more unequal over the last 20 years. Any explanation of growing wage inequality must be able to explain the movement of these indicators. These inequality indicators are computed from our analysis of the Current Population Survey (CPS) Outgoing Rotation Group (ORG) data series. Whenever the trends being discussed are different in the other major data series (the March CPS), the difference will be noted in the discussion.

The top panel shows the trends in the 90/10 wage differential and its two components, the 90/50 and 50/10 wage differential (which are also shown in **Figures 3H** and **3I**), over the 1973-95 period. These differentials reflect the growth in overall wage inequality that we are attempting to explain. The 90/10 wage gap, for instance, shows the degree to which the 90th-percentile worker—a "high-wage" worker who makes more than 90% but less than 10% of the workforce—fared better than the low-wage worker at the 10th percentile. The growth in the 90/10 differential is frequently broken down into two components: the 90/50 wage gap shows how high earners fared relative to middle earners, and the 50/10 wage gap shows how middle earners fared relative to low earners.

Among men, there was a dramatic growth in wage inequality at the top and bottom in the 1979-89 period, which has continued, in terms of the 90/50 differential, as quickly through the 1989-95 period (Figure 3H). The character of this growing male wage inequality shifted in the most recent period. In the 1980s there was a growing separation between both the top and the middle and the middle and the bottom (seen in the 50/10 differential). However, in the 1989-95 period all of the growing wage inequality was generated by a divergence between the top and everyone else: the 90/50 differential grew but the 50/10 differential did not.

Among women, the wage inequality trends across time periods are sensitive to the "endpoints," or years selected for the analysis. The data on the 90/10 differential for women in Table 3.17 suggests a large decline in women's wage inequality in the 1970s and a larger growth in the 1980s. However, the year-by-year pattern, shown in Figure 3I, shows a large dip in wage inequality between 1978 and 1979 and an equal rise between 1979 and 1980. This "jumpiness" in the data reflects the movement of the 10th-percentile wage, which grew a lot in 1979 but then fell back to its 1978 level in 1980. A better descrip-

TABLE 3.17

Dimensions of Wage Inequality, 1973-95

	Wage Differential				Change		
Differential	**1973**	**1979**	**1989**	**1995**	**1973-79**	**1979-89**	**1989-95**
Total Wage Inequality							
90/10							
Men	128%	130%	144%	151%	2	14	7
Women	116	100	135	138	-16	35	3
90/50							
Men	60%	59%	69%	76%	-1	10	7
Women	59	61	71	77	2	10	6
50/10							
Men	68%	71%	75%	75%	3	4	0
Women	57	39	64	61	-18	26	-3
Between-Group Inequality							
*College/H.S.**							
Men	32.5%	27.3%	41.8%	44.1%	-5.2	14.5	2.3
Women	43.0	30.8	46.0	51.8	-12.2	15.2	5.8
*Middle/Young***							
Men	25.8%	25.2%	29.1%	29.5%	-0.6	3.9	0.4
Women	11.8	12.2	19.7	22.5	0.4	7.4	2.8
*Old/Middle***							
Men	4.2%	6.9%	10.6%	10.3%	2.6	3.8	-0.3
Women	-3.5	-1.6	1.8	3.7	2.0	3.4	1.9
Within-Group Inequality							
Men							
90/50	40.4%	41.1%	42.9%	46.1%	0.7	1.8	3.2
50/10	39.1	42.3	46.9	40.8	3.2	4.6	-6.1
Women							
90/50	38.6%	45.9%	45.5%	47.7%	7.3	-0.4	2.2
50/10	36.2	28.7	44.0	40.7	-7.5	15.3	-3.3

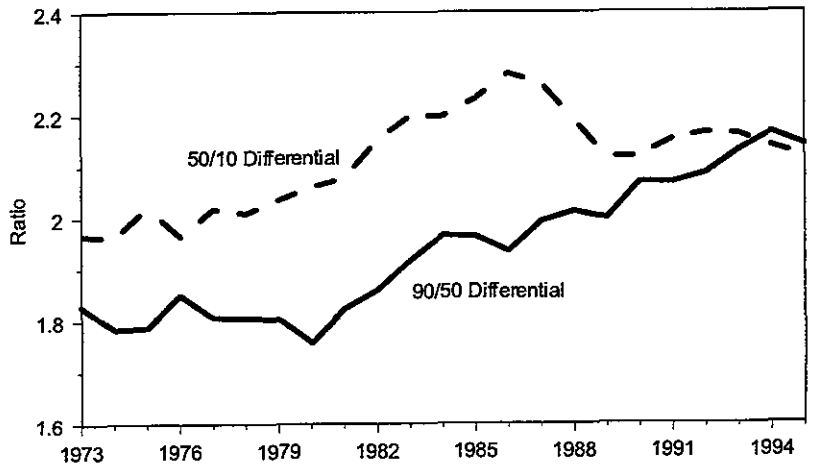
* Estimated log differential between college-only and high school graduates, controlling for experience, marital status, race, and four regions.

** Estimated log differential where experience specified as a quartic with controls for education levels, marital status, race, and four regions. Young, middle, and old reflect workers with 5, 15, and 30 years' experience.

Source: Authors' analysis.

FIGURE 3H

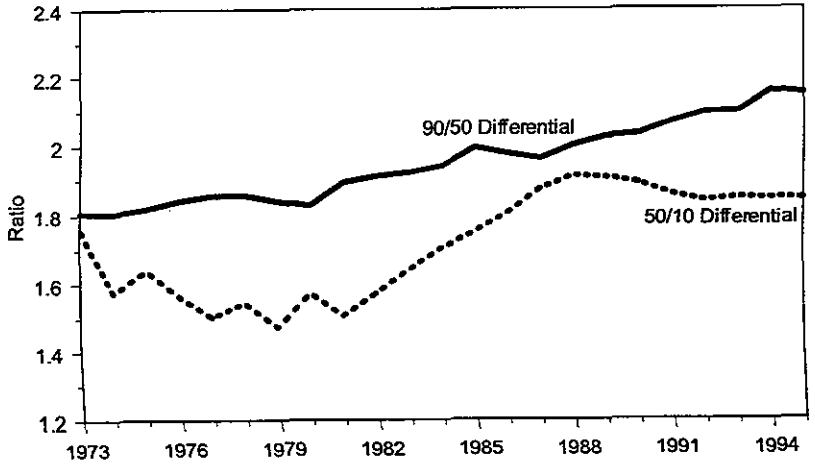
Men's Wage Inequality, 1973-95



Source: Authors' analysis.

FIGURE 3I

Women's Wage Inequality, 1973-95



Source: Authors' analysis.

tion of the trends in women's wage inequality might be that wage inequality fell between 1973 and the late 1970s (1978-80) and then rose in the 1980s. Among women, the growth of the 90/50 differential was as strong as among men in both the 1980s and 1990s. There was, however, a stronger growth of inequality at the bottom (reflected in the 50/10 differential) among women in the 1980s and an actual decline in the 1990s.

Analysts have tended to "decompose," or break down, growing wage inequality into two types of inequality—"between-group" and "within-group." The former is illustrated in Table 3.17 in two ways: the growing wage differentials between groups of workers defined by their education levels and by their labor-market experience or age. The "college wage premium"—the wage gap between college and high school graduates—fell in the 1970s among both men and women but exploded in the 1980s. The growth of the college wage premium in the post-1989 period has differed between men and women. Among men there has been only modest growth in this education premium since 1989, which year-by-year trends (discussed below) show to be flat between 1990 and 1995. Among women, however, there has been a relatively steady growth of the college wage premium in the post-1989 period equivalent to that of the 1980s.

The growth of experience differentials, reflecting the wage gap between older and middle-age and younger workers, runs parallel to that of education differentials, although the changes are smaller. The wage gap between middle-age and younger workers grew in the 1980s and continued to grow after 1989 among women. Likewise, the wage gap between older and middle-age workers grew over the entire 1973-89 period and continued into the recent period among women.

Within-group wage inequality—wage dispersion among workers with comparable education and experience—has been a major dimension of growing wage inequality. The growth of within-group wage inequality, according to Table 3.17, has differed across time periods, the segment of the wage structure (the top versus the bottom), and gender. For instance, the growth of within-group wage inequality among men in the upper half of the wage structure (the 90/50 gap) has been growing over the entire 1973-95 period, but at an accelerated pace in the 1980s and again in the 1990s. In contrast, within-group wage inequality at the bottom among men grew similarly in the 1970s and the 1980s and then declined in the 1990s.

Within-group inequality grew the most at the bottom of the female wage structure in the 1980s, up 15.3 percentage points, but fell in both the 1970s and 1990s. Among higher-wage women the growth of within-group wage inequality was

not a factor in the 1980s but has emerged as one in the 1990s.

Since growing or shrinking within-group wage inequality has been a significant factor in various periods, particularly the 1989-95 period, it is important to be able to explain and interpret these trends. Unfortunately, the interpretation of growing wage inequality among workers with similar "human capital" has not been the subject of much research. Some analysts suggest it reflects growing premiums for skills of workers that are not captured by traditional human-capital measures available in government surveys. Others suggest that changing "wage norms," employer practices, and institutions are responsible. We turn to these trends next.

What Explains Wage Trends?

The most commonly mentioned reason for recent wage problems is slow productivity growth (i.e., changes in output per hour worked) since 1973. As the data in Table 3.1 showed, productivity has been growing 1.0% annually over the entire 1973-95 period. This is a slower growth in productivity than occurred in the pre-1973 period, a time that was labeled "the productivity slowdown."

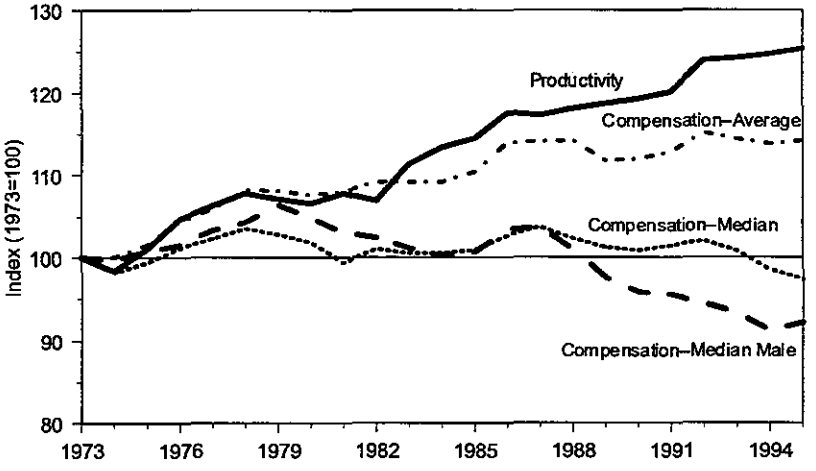
Slow productivity growth has been a major problem, but it provides only a partial explanation for average wage trends, since productivity has grown more than wages or compensation.

The relationship between hourly productivity and compensation growth is portrayed in **Figure 3J**, which shows the growth of each relative to 1973 (i.e., each is indexed so that 1973=100). As Figure 3J shows, there has been a 25% growth in productivity since 1973, enough to generate broadly shared growth in living standards and wages. Also, there is a gap between the growth of average compensation and productivity as well as between both median hourly compensation (for either men or all workers) and average compensation. The latter gap, between average and median compensation, is the larger gap and reflects growing wage inequality. Thus, the most important reason why median compensation (or wages) lags behind productivity is that growing inequality creates a "wedge" that prevents the typical worker from enjoying the "average" growth of national output or income.

There is much contention over the interpretation of the gap between average compensation and productivity. One explanation is that prices for national output have grown more slowly than prices for consumer purchases. Therefore, the same growth in nominal, or current-dollar, wages and output yields faster growth

FIGURE 3J

Productivity and Average and Median Compensation, 1973-95



Source: Authors' analysis.

in real (inflation-adjusted) output (which is adjusted for changes in the prices of investment goods, exports, and consumer purchases) than in real wages (adjusted for changes in consumer purchases only). That is, workers have suffered a worsening "terms of trade," in which the prices of things they buy (i.e., consumer goods) have risen faster than the items they produce (consumer goods but also capital goods).

This "terms of trade" explanation is actually more of a description than an explanation. A growing gap between output and consumer prices has not been a persistent characteristic of our economy, and the emergence of this gap requires an exploration of what economic forces are driving it. Once the causes of the price gap are known (not simply "accounted for"), it can be interpreted. In the meantime, there are two ways to look at the divergence of compensation and productivity created by the "terms of trade" shift of prices. One is to note that, regardless of cause, the implication is that the "average" worker is not benefiting fully from productivity growth. Another is to note that the price divergence does not reflect a redistribution from labor to capital, that is, the gap between

Technology's Impact

Technological change can affect the wage structure by displacing some types of workers and by increasing demand for others. Given the seemingly rapid diffusion of microelectronic technologies in recent years, many analysts have considered technological change as a major factor in the recent increase in wage inequality. Unfortunately, because it is difficult to measure the extent of technological change and its overall character (whether it is generally de-skilling or up-skilling and by how much), it is difficult to identify the role of technological change on recent wage trends. More than a few analysts, in fact, have simply assumed that whatever portion of wage inequality is unexplained can be considered to be the consequence of technological change. This type of analysis, however, only puts a name to our ignorance.

It is easy to understand why people might consider technology to be a major factor explaining recent wage and employment trends. We are often told that the pace of change in the workplace is accelerating, and there is a widespread visibility of automation and robotics; computers and microelectronics provide a visible dimension evident in workplaces, such as offices, not usually affected by technology. The economic intuition goes beyond this; research has shown (see Table 3.30, for instance) that the most recent wage inequality and the employment shift to more-educated workers has occurred within industries and has not been caused primarily by shifts across industries (i.e., more service jobs, fewer manufacturing jobs). Research has also shown that technological change has traditionally been associated with an increased demand for more-educated or "skilled" workers. This pattern of change suggests an increase in "skill-biased technological change" driving large changes within industries.

Because wages have risen the most for groups whose supply expanded the fastest (e.g., college graduates), most economists have concluded that nonsupply factors (i.e., shifts in demand or institutional factors) are the driving force behind growing wage inequality. They reason that those groups with the relatively fastest growth in supply would be expected to see their wages depressed relative to other groups unless there were other factors working very strongly in their favor, such as a rapid expansion in demand. Rapid technological change favoring more-educated groups could logically explain demand-side shifts leading to wider wage differences.

There are many reasons to be skeptical of a technology-led increase in demand for "skill" as an explanation for growing wage inequality. First, note that there has been little or no growth in multifactor productivity (a commonly used

proxy for technological change) for decades, nor has there been any greater growth in labor productivity in recent years. However, the technology explanation assumes that there was a large technology-led transformation of the workplace that substantially decreased the need for "unskilled" workers and thereby led to a large shift in wage differentials. It is implausible that there has been a technology shock that has transformed workplaces but has not boosted productivity growth.

Second, the experience since the mid- to late 1980s does not accord with a technology explanation, whose imagery is of computer-driven technology bidding up the wages of "more-skilled" and "more-educated" workers, leaving behind a small group of "unskilled" workers with inadequate skills. The facts are hard to reconcile with the notion that technological change grew as fast or faster in the 1990s than in earlier periods. If technology were adverse for "unskilled" or "less-educated" workers, then we would expect a continued expansion of the wage differential between middle-wage and low-wage workers (the 50/10 differential). Yet, the 50/10 differential has been stable or declining among both men and women since 1986 or 1987. Instead, we are seeing the top earners pulling away from nearly all other earners. Therefore, there seem to be factors driving a wedge between the top 10% and everyone else, rather than a single factor aiding the vast majority but leaving a small group of unskilled workers behind. Further confirmation of the breadth of those left behind is that wages have been stable or in decline for the bottom 80% of men and the bottom 70% of women over the 1989-95 period, with wages falling for the entire non-college-educated workforce (roughly 75% of the workforce). Of course, even high-wage, white-collar, or college-graduate men have failed to see real wage growth in 10 years.

The flattening of the growth of education differentials in the late 1980s and 1990s among men also does not easily fit a technology story. Since the wages of college-graduate men are not being "bid up" relative to others at the same pace as in the early and mid-1980s, one can only conclude that there has been a deceleration of the relative demand for education (given that the supply of college workers did not accelerate). This would not be the case if technology was being introduced into workplaces at the same or a faster pace in the late 1980s or in the 1990s. Moreover, the late 1980s to mid-1990s period has been one of continued growth of wage inequality as the top pulls away from the middle and bottom; since this growing gap is not being driven by wider education differentials (the primary mechanism by which technology leads to greater wage inequality), it is hard to believe that technology is playing a major role. As shown earlier, only a small portion of the growth of wage inequality in the 1990s can be

attributed to a change in the "returns to skill."

Third, there is no evidence that the growth of wage inequality over the entire 1973-95 period has been primarily driven by changes in the economic return to education or experience, the most easily measured dimensions of skill. Rather, wage inequality has been largely driven by the growth of within-group wage inequality—the growing gap among workers with similar education and experience. The growth of within-group inequality may be related to technological change if it is interpreted as a reflection of growing economic returns to worker skills that are not easily measured (motivation, aptitudes for math, etc). However, there are no signs that the growth of within-group wage inequality has been fastest in those industries where the use of technology grew the most (as discussed below). It is also unclear why the economic returns for measurable skills (e.g., education) and unmeasured skills (e.g., motivation) should not grow in tandem. In fact, between-group and within-group inequality have not moved together in the various subperiods since 1973.

Finally, the notion that technology has been "bidding up" the wages of the "skilled" relative to the "unskilled" does not accord with the basic facts presented earlier. Or, it holds true in a "relative" but not an "absolute" sense. The wages of skilled men, defined as white-collar, college-educated, or 90th-percentile workers, have been flat or declining since the mid-1980s. As described in Chapter 4, white-collar men have increasingly become displaced and beset by employment problems. High-wage women have continued to see their wages grow, but it does not seem likely that technology is primarily affecting skilled women but not skilled men.

The rhetoric in the discussion of technology's role in growing wage inequality presumes that we have entered a new era of technological change, signified by the computer revolution. In this scenario, either the rate of introduction of new technologies or the types of technologies being introduced is creating a new situation in today's workplace, along with an enhanced demand for cognitive skills. Some analysts have explicitly talked in terms of a "technology shock." This widely expressed view assumes an *acceleration* of technology's impact on relative demand, suggesting that one test of the technology hypothesis is whether technology had a greater impact on skill demand in the 1980s or 1990s than in the 1970s or earlier periods.

That a technology explanation requires an acceleration of technology's impact on workplace skills is implicit in the conventional demand-and-supply framework used to explain wage differentials. As discussed earlier, most analysts have concluded that the growth of wage inequality since 1979 must be primarily explained by demand-side factors (or non-supply-side factors, including institutional shifts) rather than supply-side factors (i.e., fewer college graduates). This is why there has been such a focus on trade, industry shifts, and technological change, all factors that could explain shifts in "relative demand." However, it would not make sense to be seeking the source of relative-demand shifts in the 1980s and 1990s if demand trends were essentially the same over the last few decades. Similarly, demand-side shifts seem relevant to explaining a wage inequality originating in the 1980s only if there were something new and different about recent demand trends. In fact, if the relative demand for skill grew at the same pace over the last three decades—at a smooth, secular, or historic rate—then the only factors that could be different in the 1980s and explain growing wage inequality are those affecting the supply of "skills," a context with no possible special role for trade, technology, or other factors shaping relative demand.

Commonly accepted evaluations of wage trends also suggest that there was a demand-side acceleration in the 1980s. One can potentially find a demand-side acceleration through an examination of either between-group or within-group wage-inequality trends. That is, one can find demand-side acceleration in the "relative demand for education" or the demand for skills as reflected in within-group wage inequality. **Table 3.48** presents the possible combinations of trends, with an evaluation of each demand trend as either "accelerated" or "historic," the latter meaning a smooth, constant, or secular growth. The point is that in three of the four scenarios there is an implicit acceptance of demand-side acceleration. In the remaining scenario, number four, the demands for skill or education grew at the "historic" rate, leaving supply-side factors as the force driving wage inequality. Thus, technology, a demand-side factor, can only be a cause of growing wage inequality if one of the first three scenarios holds and technology is the source of the acceleration. Again, a technology explanation makes sense only if there is a greater growth in the demand for skills in the 1980s and 1990s than in earlier periods and if these demand-side changes can be attributed to technological change. This motivates our efforts to test for an acceleration of technology's impact on the use of "more-educated" and "higher-paid" workers.

It is also useful to distinguish between the role of technology in the growth of wage inequality and the issue of "skill complementarity," the concept that there is a positive relationship between capital (e.g., computers) and worker skill. The existence of skill complementarity is one of the main explanations of the growing need for workers with more education and skills—as investment or capital per worker has grown, the need for more skills has grown commensurately. The explanation of growing wage inequality, on the other hand, requires an analysis

TABLE 3.48

Possible Empirical Scenarios and Demand Acceleration

Scenario	Growth in 1980s Relative to 1970s: Relative Demand for Education	Growth in 1980s Relative to 1970s: Within-Group Wage Inequality	Was There Demand Side Acceleration?
1.	Accelerated	Accelerated	Yes
2.	Normal	Accelerated	Yes
3.	Accelerated	Normal	Yes
4.	Normal	Normal	No

Source: Mishel and Bernstein (1996).

that separates out the *growth* of the relative supply and demand for education/skill. To show that relative demand for skill is accelerating (as is necessary, as argued above), it is not enough to simply cite the existence of skill complementarities, since such complementarities have long been associated with the need for greater skills and education. That is, technological change has been a force for increasing employers' demand for "more-skilled" and "more-educated" workers for a long time. The issue regarding wage inequality is whether technological change has increased "demand for skill" faster than the "supply of skill" has been growing.

We do not question that technological change and capital accumulation have been historically associated with the need for greater skills and education. Technology and investment have been major forces driving the long-term growth of demands for skill.

But, is there reason to believe that technology's impact accelerated in the 1980s or 1990s? Technological change is inherently difficult to quantify. The approach taken here is to examine the "impact of technological change," a concept with two components. The first is a set of "technology indicators," such as equipment accumulation and R&D, that are closely correlated with or accompany the introduction of new technology in the workplace. The second component is the relationship, or "complementarity," between technology and the need for more skill or education. Technology will have a greater impact the faster the

introduction of new technologies, proxied by "technology indicators," and the more that skills are required by the new technologies, as reflected in estimated "complementarities."

Table 3.49 presents some indicators of technological change. Two measures of productivity growth are presented, since technology is considered to be a major factor behind productivity growth. Neither the measure of labor productivity (changes in output per hour worked) nor that for multifactor productivity (the growth in output after netting out the contribution of more hours, more capital, and a higher-quality workforce) grew faster in the 1980s or 1990s than in the 1970s.

Capital accumulation, or increased investment per worker, is often considered to be the main mechanism through which technology is brought into the workplace—as employers upgrade their equipment or build new facilities, they frequently incorporate technological advances and new work systems. Yet the growth of equipment per worker was actually slower in the 1980s than in the

TABLE 3.49

Technology Indicators, 1973-94

	Annual Growth: 1973-79	1979-89	1989-94
R&D			
Total R&D Capital Stock/Worker	-0.01%	0.85%	n.a.
Share of Scientists/Engineers*	0.64	0.44	0.81%
Investment**			
Equipment per Worker	3.57%	2.53%	0.48%
Computer Equipment per Worker	24.05	25.71	12.06
Productivity***			
Labor	1.0%	1.0%	1.1%
Multifactor	0.3	0.0	0.1

* In private sector. Annualized percentage-point change.
** Per private-sector FTE.
*** Private nonfarm business sector. The last period is 1989-93.

Source: Mishel and Bernstein (1996).

1970s, suggesting a possible deceleration of technological change. Equipment accumulation slowed nearly to a halt (0.48% per year) in the 1990s. However, there was an acceleration in investment per worker in computerized equipment in the 1980s, but a slowdown in the 1990s. If computerized equipment has a greater effect on the employment structure than other types of equipment (i.e., stronger complementarities), then a shift in the composition of equipment toward computerization could potentially have created a technology shock in the 1980s. Whether investment trends have led to an accelerated technology impact depends, therefore, on whether computerized equipment had a larger impact than other types of equipment investment in the 1980s or 1990s.

Last, aggregate research and development (R&D) activity grew faster in the 1980s than in the 1970s in one measure (R&D capital stock per worker). The trend in the growth in the share of scientists and engineers in total employment slowed in the 1980s but accelerated in the 1990s. Thus, R&D trends, like those for investment, present a mix of evidence, some pointing to a possible acceleration and some to deceleration. Whether technological change had a greater impact on the demand for skills in the 1980s and 1990s relative to the 1970s will thus depend heavily on whether there was a shift in "complementarities," the second component.

Table 3.50 presents quantitative estimates of the impact of technological change on the rate at which there were within-industry shifts toward the use of more-educated workers (i.e., the effect of technology on relative demand within industries). These estimates combine the effect of changes in both components of "technology's impact"—changes in the rate of introduction of new technology and changes in the relationship of new technology to skill requirements. The study from which these data are drawn determined that computerized equipment had no different effect than other types of equipment. Thus, a changing composition of capital investment (proportionately more computers but less of other equipment) did not create a 1980s or 1990s technology shock. The study, therefore, estimated the effect of R&D activity and equipment accumulation on educational upgrading in each period, allowing the per-dollar impact (the complementarity) to vary in each decade. The estimated "impact of technology" reflects new investment, R&D innovations, and any associated technical, work organization, or work-process changes. Estimates are also presented that allow for a possible impact of the shift toward more computerized equipment.

Specifically, Table 3.50 presents the estimated impact of technology on the growth in the shares of workers with particular levels of education in three periods, 1973-79, 1979-89, and 1989-94. Estimates are also presented in the differences in technology's impact across time periods. The critical issue to be addressed is whether technology's impact was greater in the 1980s or 1990s than in the 1970s.

The data in Table 3.50 suggest that technology did not have a greater impact in more recent years. This can be seen in the results for the share of workers with a high school degree in the first column. Technology's impact has been to reduce the share of male workers with a high school degree in each time period, but more strongly so in the 1970s than in the later periods. Over the 10 years from 1979 to 1989, technology led to a 1.21-percentage-point (.121 per year) shrinkage in the share of high school workers employed within industries. This technology impact was significantly lower than that found for the 1973-79 period (a 0.378-percentage-point shrinkage per year). Technology's impact on male high school graduates not only did not accelerate in the 1980s, but actually decelerated. Comparable results are seen for the impact of technology on the use of male college graduates: technology is associated with increased male "college or more" employment in each period, but more so in the 1970s than in later periods. For men, there is no evidence of an "acceleration" of technology's impact and some evidence for deceleration.

There is some support for an acceleration of technological change among women. Technology's impact on the employment of high school graduates was negative in the 1980s and 1990s but positive in the 1970s. Similarly, the impact on the use of women with a "college degree or more" grew in each period. Nevertheless, the shift in technology's impact between the 1970s and later periods generally does not pass a statistical test for significance (see the last two panels). Moreover, the size of the acceleration was small at best. In the case of high school "equivalents," for instance, the acceleration between the 1970s and 1980s implies a demand shift away from them, amounting to about half of a percentage point less over a 10-year period.

These estimates of technology's impact address the issue of the acceleration of demand for education and thus relate to the growth of education wage differentials. As previously discussed, however, changes in education differentials can account for just a third of the growth of overall wage inequality, the other portion being the growth of within-group inequality. The results in **Table 3.51** relate to the broadest measure of technology's impact—its effect on the use of workers with high, middle, or low wages (divided into five different categories). These estimates incorporate the impact of technology on both education differentials and within-group inequality.

The results for men run counter to the notion that technology was more ad-

TABLE 3.51

Technology Impact on Annual Change in Wage Quantities, 1973-94

Dependent Variable	Technology Impact*			
	Men		Women	
	Without Computers	With Computers	Without Computers	With Computers
Low Wage				
1. 1973-79	-0.123	-0.066	0.283**	0.101**
2. 1979-89	-0.026	0.503	-0.006	0.621***
3. 1989-94	-0.126**	0.429	-0.034	0.071**
4. 80s Less 70s	0.097	0.569	-0.289***	0.520
5. 90s Less 70s	-0.003	0.495	-0.317**	-0.029
6. 90s Less 80s	0.101	-0.073	-0.028	-0.550
Low-Middle Wage				
1. 1973-79	-0.684	-0.734**	-0.412**	-0.354
2. 1979-89	-0.060	-0.472	0.008	-0.169
3. 1989-94	0.023	0.151	-0.003	-0.200
4. 80s Less 70s	0.624**	0.262	0.403**	0.186
5. 90s Less 70s	0.708**	0.885	0.408**	0.154
6. 90s Less 80s	0.084	0.623	0.005	-0.031
Upper-Middle Wage				
1. 1973-79	0.027	0.228	-0.411**	-0.717***
2. 1979-89	-0.163**	-0.046	-0.133	0.013
3. 1989-94	-0.004	-0.536	0.062	0.372
4. 80s Less 70s	-0.189	-0.274	0.278**	0.730***
5. 90s Less 70s	-0.031	-0.764**	0.472**	1.088**
6. 90s Less 80s	0.159**	-0.490	0.194	.358
High Wage				
1. 1973-79	0.481**	0.259	0.209**	0.652**
2. 1979-89	0.109***	0.016	-0.023	-0.053
3. 1989-94	0.096	0.127	-0.031	-0.037
4. 80s Less 70s	-0.372**	-0.242	-0.232***	-0.706**
5. 90s Less 70s	-0.384**	-0.132	-0.240**	-0.689**
6. 90s Less 80s	-0.012	0.111	-0.008	0.017

TABLE 3.51 *(cont.)*

Technology Impact on Annual Change in Wage Quantities, 1973-94

Dependent Variable	Technology Impact*			
	Men		Women	
	Without Computers	With Computers	Without Computers	With Computers
Very High Wage				
1. 1973-79	0.300**	0.312**	0.330**	0.319
2. 1979-89	0.140**	-0.001	0.170**	-0.412
3. 1989-94	0.011	-0.171	0.007	-0.206
4. 80s Less 70s	-0.160***	-0.313	-0.159	-0.730***
5. 90s Less 80s	-0.289**	-0.484**	-0.323**	-0.525
6. 90s Less 80s	-0.129**	-0.171	-0.164	.206

* The impact of technology indicators on the annual rate of growth of education upgrading within industries. Technology represented by the impact of R&D and equipment accumulation per worker in all estimates. Computer accumulation added for the second specification.

** Significantly different from zero at 5% level of confidence.

*** Significantly different from zero at 10% level of confidence.

Source: Mishel and Bernstein (1996).

Among women, technology shifted against the highest wage groups (the "high" and "very-high" groups) and the low-wage group but favored the employment of middle-wage women. The "strengthening of the middle" phenomenon among women again contradicts the story that technology has been helping the "skilled" relative to the "unskilled," unless one's view of the "unskilled" includes only the lowest-wage women (about 20% of the total).

These estimates of technology's impact on the use of more-educated or higher-wage workers do not support a technology explanation for growing wage inequality. The primary mechanism by which technology is thought to affect wage inequality is increasing the demand for "more-educated" workers (i.e., college graduates) and thereby bidding up their wages as demand exceeds supply. Our estimates, however, suggest there was no technology-led acceleration of demand for educated workers (or a quantitatively trivial acceleration in the case of women)

in the 1980s or 1990s that could have led to increased education wage differentials. Further, when looking at the increased use of high-wage workers (presumably "high-skilled"), we find that technology was less favorable to the increased utilization of high-wage men or women after 1979. Among women, technology may have played a role in creating wage inequality at the bottom, since technology had an adverse impact on very low-wage women. However, technology was a force for compressing rather than expanding the wage gap between the top and the middle among women. Among men, technology's impact was equalizing at both the top and the bottom of the distribution after 1979 and, therefore, technological change is not a plausible explanation for the widening of the male wage structure.

Executive Pay Soars

Another cause of greater wage inequality has been the enormous pay increases received by top executives and the spillover effects of these increases. These large pay raises go far beyond those received by other white-collar workers.

The 1980s and 1990s have been prosperous times for top U.S. executives. In stark contrast to the declining real wages of typical workers, the total pay (salaries, bonuses, and benefits) of the chief executive officers (CEOs) of major U.S. companies grew 5.7% annually from 1978 to 1989, a total growth of 83.2% **(Table 3.52)**.

In the 1989-95 period, CEO total pay grew 5.4% annually. CEO salaries were stable: the pay raises were the result of large increases in bonuses, stock options, and other forms of compensation. Between 1978 and 1995, the total pay of the average CEO at a major U.S. company grew 152%, from $1,736,000 to $4,367,000 (in 1995 dollars).

The increased divergence between the growth of CEO pay and an average worker's pay is captured in the growth of the ratio of CEO to worker pay, shown in Table 3.52. In 1978, U.S. CEOs in major companies earned 60.2 times more than an average worker; this ratio grew to 172.5 by 1995. This contrasts even more sharply with the 39.5 ratio prevailing in 1965 (See **Figure 3R**).

U.S. executives are not only paid far better than U.S. workers, they also earn substantially more than CEOs in other advanced countries. **Table 3.53** presents an index of CEO pay, with U.S. compensation set to 100 (any index value less than 100 implies that that country's CEOs earn less than U.S. CEOs). The index shows that U.S. CEOs earn double the average of the 13 other advanced coun-

TABLE 3.52

Growth of CEO Pay in Major U.S. Companies, 1965-95

(1995 Dollars)

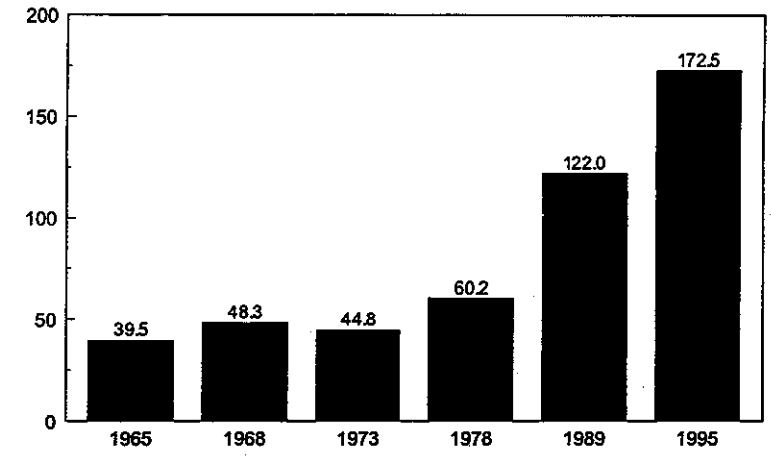
Year	CEO Pay Total* ($000)	CEO Pay Salary ($000)	Ratio of CEO to Worker Pay Total	Ratio of CEO to Worker Pay Salary
1965	$971	$615	39.5	27.8
1968	1,209	558	48.3	24.8
1973	1,269	655	44.8	26.9
1978	1,736	695	60.2	29.1
1989	3,180	998	122.0	46.7
1995	4,367	991	172.5	48.2
Annual Growth				
1965-73	3.4%	0.8%		
1973-78	6.5	1.2		
1978-89	5.7	3.3		
1989-95	5.4	-0.1		

* Includes salaries, bonuses, value of restricted stock, stock options at time of grant, plus other long-term payouts.

Source: *Wall Street Journal* and Pearl Meyer & Partners Inc.

FIGURE 3R

Ratio of CEO to Average Worker Pay, 1965-95



Source: Pearl Meyer & Partners Inc. (1996).