The State of Working America
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Wages

EPI DIGITAL EDITION

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CHAPTER 4

Wages

The top, and very top, outpace the rest

Wage trends are the driving force behind trends in income growth and income inequality; wages and salaries constitute about three-fourths of total family income, and more than three-fourths of income of families in the broad middle class. Given the foundational nature of wages, it is discouraging that real hourly compensation (wages and benefits) of the median worker rose just 10.7 percent between 1973 and 2011. Most of this growth occurred in the late 1990s wage boom, and once the boom subsided by 2002 and 2003 real wages and compensation stagnated for most workers—college graduates and high school graduates alike. This makes the last decade a "lost decade" for wage growth. If high unemployment persists, as is likely, there will be another lost decade ahead. This chapter examines and explains the trends in wage growth and wage inequality in the last few decades that have generated this outcome.

A key feature of the labor market since 1973—one that was not present in prior decades—has been the stunning disconnect between the economy's potential for improved pay and the reality of stunted pay growth, especially since 2000. Productivity grew 80.4 percent between 1973 and 2011, when, as noted, median worker pay grew just 10.7 percent. Since 2000, productivity has grown 22.8 percent, but real compensation has stagnated across the board, generating the largest divergence between productivity and pay in the last four decades. Stagnant wage and benefit growth has not been due to poor overall economic performance; nor has it been inevitable. Rather, wage and benefit growth stagnated because the economy, as structured by the rules in place, no longer ensures that workers' pay rises in tandem with productivity.

The wedges between the growth of productivity and pay primarily are the increase in wage (and compensation) inequality and the declining share of overall income made up of wage (labor) income as it was displaced by income accruing to wealth—capital income such as profits, dividends, capital gains, and so on. The dynamic behind both of these wedges is worker disempowerment.

Wage inequality can best be understood when it is broken down into three widening wage gaps, each of which has had a differing historical trajectory. The gap within the "bottom," reflecting the difference between middle-wage (median-wage) earners and low-wage workers (10th-percentile wage earners), grew in the 1980s but has been stable or declining ever since. In contrast, the wage gap within the "top half," between high-wage (90th- or 95th-percentile wage earners) and middle-wage earners, has persistently grown since the late 1970s. The third wage gap is that between the very top wage earners, those in the top 1.0 percent and even the top 0.1 percent, relative to other high-wage earners. The very highest earners have enjoyed considerably better wage growth than all other workers for at least 30 years.

These shifts in wage inequality have derived from several key factors, which affect low-, middle-, and high-wage workers differently. High unemployment in the early and mid-1980s greatly increased wage inequality, especially at the bottom, and provided the context in which other forces—specifically, a weakening of labor market institutions and globalization—could drive up wage inequality. In contrast, the low unemployment of the late 1990s helped offset other factors driving up wage inequality. These other factors have included shifts in labor market policies and institutions, such as the severe drop in the minimum wage; deunionization; the increasing globalization of the economy (and accompanying trends in immigration, trade, and capital mobility); and the employment shift toward lower-paying service industries (such as retail trade) and away from manufacturing. High levels of unemployment in recent years have again weakened wage earners' prospects in the face of these other factors driving wage inequality.

The greatest increase in wage inequality at the bottom occurred among women and corresponded to the fall in the minimum wage over the 1980s, the high unemployment of the early and mid-1980s, and the expansion of low-wage retail jobs. High unemployment in the early and mid-1980s also knocked down wages of low-wage men and widened the wage gap at the bottom. The "90/50" and "95/50" gaps between high- and middle-wage earners have grown fairly steadily for 30 years, due to the continuing influence of globalization, deunionization, the shift to lower-paying service industries ("industry shifts"), high unemployment, and other factors that disempower workers.

Gaps at the very top grew greatly from 1979 to 2007 as the top 1.0 percent of earners more than doubled their share of total annual wages and the top 0.1 percent more than tripled their share of total wages. Wages at the top plummeted

as stock prices fell in 2007–2009 but started a strong recovery in 2010. The disproportionate growth of wages at the top is closely linked to two factors: the huge growth in compensation of chief executive officers and managers, and the increasingly high wages in and expansion of the financial sector, the latter of which reflects the "financialization" of the economy. From 1978 to 2011, CEO compensation grew more than 725 percent, substantially more than the stock market and remarkably more than worker compensation, which grew by a meager 5.7 percent. Depending on the CEO compensation measure, U.S. CEOs in major companies earned 18.3 or 20.1 times more than a typical worker in 1965; this ratio grew to 29.0-to-1 or 26.5-to-1 in 1978 and to 58.5-to-1 or 53.3-to-1 by 1989. After peaking in 2000 and despite falling in the recent financial crisis, the CEO-to-worker compensation ratio was at 231.0-to-1 or 209.4-to-1 in 2011, substantially above the historic norm.

Rising inequality has been accompanied by deteriorating job quality for many workers, driven largely by a decline in the extent and quality of employer-provided benefits, most notably pensions and health insurance. Employer-provided health care coverage eroded from 1979 until 1993–1994, when it stabilized, and then began falling again after 2000; coverage dropped from 69.0 percent in 1979 to 58.9 percent in 2000 to 53.1 percent in 2010 (the latest year of data), a 5.8 percentage-point fall since 2000. Employer-provided pension coverage tended to rise in the 1990s but receded by 5.5 percentage points from 2000 to 2010 (the latest year of data) to just 42.8 percent. Pension plan quality also receded, as the share of workers in defined-benefit plans fell from 39 percent in 1980 to just 18 percent in 2004 (the latest year of data). Correspondingly, the share of workers with a defined-contribution plan (and no other plan) rose from 8 percent to 31 percent.

Young workers' prospects are a barometer of the strength of the labor market: When the labor market is strong for workers overall, the prospects for young workers are very strong, and when the labor market is weak, their prospects are very weak. Since 2000, wages have fallen among every key entry-level group—both high school and college graduates, and both men and women. For instance, in 2011 the entry-level hourly wages of young male and female high school graduates were roughly 9 percent lower than in 2000. Between 2000 and 2011, entry-level wages fell 7.6 percent for male college graduates and 6.0 percent for female college graduates.

A surprising feature of the post-2000 period is the dramatically disappointing wage trend for college graduates: From 2000 to 2011, the bottom 70 percent had stagnant or declining wages, and the bottom 90 percent had stagnant or declining wages from 2002 or 2003 to 2011. Poor wage growth occurred over roughly the last 10 years in nearly every occupation in which college graduates worked, including business and professional occupations. An increasing share of college graduates, especially younger college graduates, work in occupations that do not

require a college education. These trends cast doubt on the oft-repeated story that wage inequality is increasing due to shortages of skilled and educated workers in a time of rapid technological change.

Wage inequality is, however, affected by the decline in unionization, which lowered wages in the middle. Unionized workers earn higher wages than comparable nonunion workers and also are 18.3 percent more likely to have health insurance, 22.5 percent more likely to have pension coverage, and 3.2 percent more likely to have paid leave. The erosion of unionization among blue-collar men (from 43.1 percent in 1978 to just 17.8 percent in 2011) accounted for about three-fourths of the 10.1 percentage-point growth of the white-collar/blue-collar wage gap among men from 1978 to 2011. Research incorporating the impact of unions on wage norms and standards as well as unionism's direct impact on unionized workers shows that weaker unions were a major factor in rising wage inequality, accounting for about a third of the growth of wage inequality among men and around a fifth of the growth of wage inequality among women from 1973 to 2007.

Low-wage workers, particularly women, have also been hard-hit by the decline in the real value of the minimum wage. In 2011, the real minimum wage was 12.1 percent lower than in 1967, meaning low-wage workers, despite being older and better-educated than in the late 1960s, had a lower wage floor. The weakness of the minimum wage is more apparent when noting that in 2011 it was just 37 percent of the typical worker's hourly wage, while in the late 1960s it averaged about half the typical worker's hourly wage. The lowering of the minimum wage in the 1980s caused a severe drop in wages of low-wage women, who are the chief beneficiaries of the legislated minimum.

Will the jobs of the future require far more skills and education and necessitate a wholesale upgrading of workforce educational attainment? The jobs of the future will, in fact, require greater education credentials, but not to any large extent. In 2010 the occupational composition of jobs required that 20.0 percent of the workforce have a college degree or more. This share will rise modestly to 20.5 percent in 2020 as a result of occupational change. Whether workers in the future enjoy higher wages will depend on whether wages rise for particular occupations rather than on whether there is any shift of workers into better-paid and more-skilled occupations.

The first half of this chapter documents changes in the various dimensions of the wage structure, that is, changes in average wages and compensation, and changes by occupation, gender, wage level (by decile and the top 1.0 percent), education level, age, and race and ethnicity. Shifts in the various dimensions of wage inequality are assessed and explained in the second half of the chapter, which focuses on particular factors such as unemployment, industry shifts, deunionization, the minimum wage, globalization, immigration, and technology/skills.

Table notes and figure notes at the end of this chapter provide documentation for the data, as well as information on methodology, used in the tables and figures that follow.

Describing wage trends

The initial part of this chapter presents the key trends in wages, benefits, and overall compensation that have driven the corresponding trends in wage income of families and households—particularly the trend of growing wage and income inequality. The focus is mainly on the hourly wages of individual workers because it is the dynamics of hourly wages that have dominated trends in annual wages. Data on all nonwage benefits and on particular benefits such as health insurance, pension benefits, and paid leave are also examined. The sections below review wage trends of workers differentiated by occupation, gender, wage level (by decile and the top 1.0 percent), education level, age, race, and ethnicity. The remainder of the chapter provides an explanation of the trends in wages and wage inequality.

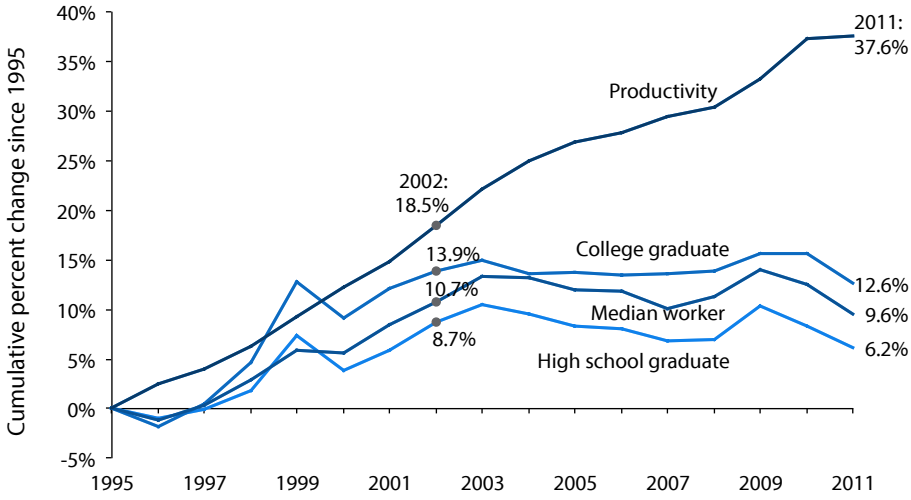
The decade of lost wage growth

As highlighted in the analyses of incomes in Chapter 2, wage stagnation has been a key factor driving the stagnation (or decline) in incomes since 2000, a period including the entire business cycle from 2000 to 2007 as well as the recession and period of high unemployment from 2007 through 2011. This stagnation occurred as a consequence of the weak recovery of the 2002–2007 period and the recession-related income losses caused by the financial crisis and its aftermath.

The data presented in Chapter 2 showed that slower growth in hourly wages and a fall in annual work hours translated into poor growth in middle-class families' annual earnings (combining those of all earners in the family) during the last business cycle and the recession. This section further explores these trends by examining the hours and wages of individual workers. Specifically, this section highlights the wage trends underpinning the lost decade: Despite continued strong productivity growth, real hourly wages failed to improve for the vast majority of the workforce, including those with a college degree, during the 2002–2007 recovery period and the recession and its aftermath.

To understand the period starting in 2000, it is necessary to put it into the context of the extraordinary real wage growth of the late 1990s. Broad-based real wage growth took hold in 1996, due to falling and sustained low unemployment amid accelerated productivity growth (and a minimum-wage increase). This late 1990s wage boom stands out as the sole period of sustained real wage growth for low-wage and middle-wage workers since 1973, as will be explored below. The important point for our current discussion is that the momentum of wage growth in the late 1990s carried over into the decade of the 2000s, leading to real wage growth even during the downturn and continuing through 2003. This trend can

Figure 4A Cumulative change in total economy productivity and real hourly compensation of selected groups of workers, 1995–2011



Source: Authors' analysis of unpublished Total Economy Productivity data from the Bureau of Labor Statistics Labor Productivity and Costs program, Bureau of Economic Analysis National Income and Product Accounts data, and Current Population Survey Outgoing Rotation Group microdata

be seen in **Figure 4A**, which shows the real hourly compensation growth (relative to 1995) of three groups of workers: high school graduates, college graduates, and the median worker, representing middle-wage workers. We start the analysis in 1995 since the productivity acceleration of the late 1990s happened soon thereafter. For all three groups, compensation grew strongly until 2003 and stagnated thereafter. (The strong bump in compensation in 2009 is the consequence of a decline in inflation that year so that even low nominal, i.e., not inflation-adjusted, compensation growth yielded a real compensation increase.) Figure 4A also includes the growth of economy-wide productivity, which grew strongly—37.6 percent—over the entire period of the late 1990s through 2011. In contrast, real hourly compensation grew a much more modest 12.6 percent for college graduates and just 9.6 percent for the median worker. The counterpoising of productivity and compensation trends highlights another key dimension of living standards and wage trends: the divergence between the economy's increased ability to provide rising living standards and its failure to do so. This will be explored in further detail later in this chapter.

With this framework in mind, we now turn to an exploration of various trends in the growth of wages, benefits, and compensation.

Contrasting work hours and hourly wage growth

To understand changes in wage trends, it is important to distinguish between trends in annual, weekly, and hourly wages. Trends in annual wages, for instance, are driven by changes in both hourly wages and the amount of time spent working (weeks worked per year and hours worked per week). Likewise, weekly wage trends reflect changes in hourly pay and weekly hours.

Table 4.1 illustrates the importance of distinguishing between annual, weekly, and hourly wage trends. For instance, from 2007 to 2010, the years of the recent downturn, average annual wages fell 0.3 percent annually. The reason for this drop was the large decline in average annual hours worked, which fell 1.2 percent annually, rather than any trend in hourly wages (which actually grew 0.9 percent annually). The point is that trends in both weekly wages and annual wages

Table 4.1 Average wages and work hours, 1967–2010 (2011 dollars)

	Productivity per hour (2005=100)	Real wage levels			Hours worked		
		Annual wages	Weekly wages	Hourly wages	Annual hours	Weeks/ year	Hours/ week
1967	52.3	$29,555	$678.58	$17.24	1,716	43.5	39.3
1973	60.2	34,378	791.40	20.50	1,679	43.4	38.6
1979	64.2	34,632	789.79	20.34	1,703	43.8	38.8
1989	73.1	37,685	830.34	21.13	1,783	45.4	39.3
1995	78.8	38,768	843.83	21.22	1,827	45.9	39.8
2000	88.5	43,616	929.04	23.24	1,876	46.9	40.0
2007	102.0	43,615	920.91	23.16	1,883	47.4	39.8
2010	108.2	43,194	928.18	23.79	1,815	46.5	39.0
Annual growth rate*							
1967–1973	2.4%	2.5%	2.6%	2.9%	-0.4%	0.0%	-0.3%
1973–1979	1.1	0.1	0.0	-0.1	0.2	0.2	0.1
1979–1989	1.3	0.8	0.5	0.4	0.5	0.3	0.1
1989–2000	1.7	1.3	1.0	0.9	0.5	0.3	0.2
1989–1995	1.3	0.5	0.3	0.1	0.4	0.2	0.2
1995–2000	2.3	2.4	1.9	1.8	0.5	0.4	0.1
2000–2007	2.0	0.0	-0.1	-0.1	0.1	0.1	-0.1
2007–2010	2.0	-0.3	0.3	0.9	-1.2	-0.6	-0.6

* Log growth rate

Source: Authors' analysis of unpublished Total Economy Productivity data from the Bureau of Labor Statistics Labor Productivity and Costs program, Current Population Survey Annual Social and Economic Supplement microdata, and Murphy and Welch (1989)

are affected by trends in work time, such as weekly hours or weeks worked yearly. In other periods the annual wage growth was boosted by increased annual hours worked. In fact, this was true in every business cycle in the 1970s, 1980s, 1990s, and 2000s, as can be seen by the increased growth in annual hours.

Table 4.1 shows the sharp acceleration in hourly wage growth (to 1.8 percent) from 1995 to 2000, which was a clear departure from the measly 0.1 percent growth of the earlier part of that business cycle (1989–1995) and the 0.4 percent growth of the prior business cycle (1979–1989). Despite strong productivity growth in the succeeding business cycle, 2000–2007 (nearly on par with the 2.3 percent growth of the late 1990s), real hourly wage growth was stagnant (-0.1 percent). The stronger real wage growth of the 2007–2010 period is an artifact of the fall in energy prices that led to negative inflation in 2009.

Not surprisingly, trends in family income correspond to the shift from strong annual wage growth in the late 1990s to the falloff in income among working-age families in the next business cycle (2000–2007). For instance, the strong pickup in overall wage growth in the late 1990s, along with an even stronger increase in wage growth at the bottom end of the wage scale (detailed below), is the main factor behind the widespread improvements in family income (discussed in Chapter 2) and reductions in poverty (discussed in Chapter 7) seen in the late 1990s.

This chapter focuses on the hourly pay levels of the workforce and its subgroups in order to distinguish changes in earnings resulting from more (or less) pay from those stemming from more (or less) work. Also, the hourly wage can be said to represent the "true" price of labor (exclusive of benefits, which we analyze separately). Moreover, changes in the distribution of annual earnings have been predominantly driven by changes in the distribution of hourly wages and not by changes in work time. Chapter 5 addresses employment, unemployment, underemployment, and other issues related to changes in work time and opportunities.

Contrasting compensation and wage growth

A worker's pay, or total compensation, is made up of both nonwage payments, referred to as fringe benefits, and wages. Much of the analysis in this chapter focuses on wages because there are no data on workers' hourly compensation, including benefits, that can be analyzed by wage level, race/ethnicity, gender, or education. But the available data do allow an examination of overall compensation trends and how they differ from overall wage trends.

Table 4.2 uses the two data series that are available to examine changes in compensation. We employ the wage and compensation data that are part of the National Income and Product Accounts (NIPA) to track the historical trends from 1948 to 1989. These NIPA data are the Commerce Department's measure of the size of the national economy, termed the gross domestic product. Compensation levels exceed wage levels because they include employer payments for

Table 4.2 Average hourly pay and pay inequality, 1948–2011 (2011 dollars)

	Wages and salaries	Benefits*	Total compensation	Benefit share of compensation
Real hourly pay** (NIPA)				
1948	$9.69	$0.53	$10.21	5.1%
1989	20.14	4.61	24.75	18.6
Annual percent change				
1948–1973	2.6%	7.3%	3.0%	
1973–1979	0.2	5.2	1.0	
1979–1989	0.8	1.0	0.8	
Real hourly pay** (ECEC)				
1987	$21.08	$5.30	$26.38	20.1%
1989	20.68	5.30	25.98	20.4
1995	20.23	5.18	25.41	20.4
2000	21.43	4.79	26.22	18.3
2007	22.74	5.60	28.34	19.8
2011	22.53	5.57	28.10	19.8
Annual percent change				
1989–2000	0.3%	-0.9%	0.1%	
1989–1995	-0.4	-0.4	-0.4	
1995–2000	1.2	-1.6	0.6	
2000–2007	0.9	2.3	1.1	
2007–2011	-0.2	-0.2	-0.2	
Measures of inequality	***Wages***		***Compensation***	
	Std. dev.	**Gini**	**Std. dev.**	**Gini**
1987	0.564	0.317	0.597	0.326
1997	0.578	0.329	0.620	0.346
2007	0.592	0.340	0.639	0.354
Change, 1987–2007	**0.028**	**0.023**	**0.042**	**0.028**

* Includes payroll taxes, health, pension, and other nonwage benefits
** Deflated by personal consumption expenditures (PCE) index for all items, except health, which is deflated by PCE medical index. NIPA data are for the entire economy; ECEC data are for the private sector.

Source: Authors' analysis of Bureau of Labor Statistics National Compensation Survey employment cost trends and benefits data, Bureau of Economic Analysis National Income and Product Accounts, and Pierce (2010)

health insurance, pensions, and payroll taxes (primarily payments toward Social Security and unemployment insurance). We track more recent trends with data on the private sector drawn from the Bureau of Labor Statistics Employer Costs for Employee Compensation (ECEC) survey, a more detailed source that provides the value of wages and employer-provided benefits for each year since 1987, the first survey year. These data vary from those in NIPA because they describe only

the private sector (government employment is excluded) and because the definition of "hours worked" is different.

It is important to note that these compensation data are averages covering the entire economy or private sector, from low-paid hourly workers to high-paid executives. Since we know there has been a sizable rise in wage inequality, we also know that trends in wages or compensation of the "average" worker diverge sharply from (i.e., rise faster than) trends for typical or median workers. Therefore, compensation trends presented in Table 4.2 do not correspond to those experienced by middle-wage or typical workers.

Measured over the long term, benefits have become a more important part of the average worker's total compensation package. In 1948 payroll taxes and health and pension benefits made up only 5.1 percent of compensation. By 1989 the share had risen to 18.6 percent. But the benefit share of compensation has remained largely flat since 1987—according to ECEC data, it was 20.1 percent in 1987 and 19.8 percent in both 2007 and 2011. In other words, the growth of total compensation has largely paralleled that of wages over the last 20 or 30 years. It is still worthwhile to track each component measure of compensation separately when possible because they can, and have, diverged in particular periods (benefits even fell in the late 1990s but then regained ground in recent years). One implication of compensation and wages growing roughly in tandem is that analyses (such as the one below) that focus on wage trends are using an appropriate proxy for compensation, at least on average. However, analyses of wage growth sometimes overstate the corresponding growth of compensation, as in the latter 1990s, and sometimes understate compensation growth, as in 2000–2007.

Table 4.2 also presents inequality measures for compensation and wages in 1987, 1997, and 2007. Inequality of compensation is greater than inequality of wages in each year using either the standard deviation (a measure that shows the degree to which data vary from the average) or the Gini coefficient measure, a measure of dispersion wherein zero expresses perfect equality (everyone has exactly the same wage) and one expresses maximal inequality (only one person has all the wage income). Moreover, the growth of inequality between 1987 and 2007 was greater for total compensation than for wages, meaning that adding benefits to the overall picture does not negate findings using wage data but actually strengthens them. Again, these results may differ when considering particular time periods or when examining particular aspects of the pay structure, such as the difference between the top and the middle versus the difference between the middle and the bottom.

From 2000 to 2007, benefits grew much faster than average wages, 2.3 percent annually versus 0.9 percent, but since benefits made up less than 20 percent of compensation, the rise in total compensation (1.1 percent annually) was closer to the wage trend. A different trend prevailed in the late 1990s, when benefits declined by 1.6 percent annually while wages rose 1.2 percent. Hourly total

compensation, in fact, grew faster from 2000 to 2007 than in the late 1990s; while wage growth slowed in the later period, compensation growth accelerated. This comparison is a bit skewed for reasons we have identified previously—the momentum of fast wage growth in the late 1990s carried over into the early part of the 2000s but then disappeared. The trends over the recovery from 2002 to 2007 (after the earlier wage momentum had subsided) affirm this, as annual wage and compensation growth in that period were just 0.4 percent and 0.7 percent, respectively (not shown in the table).

Over the four years since the recession began in 2007, compensation fell 0.2 percent a year, in line with the 0.2 percent annual declines in both benefits and wages.

Trends in specific benefits such as health insurance and pensions are examined later in this chapter.

Wages of production and nonsupervisory workers

The pattern of growth or decline in wages of the various segments of the workforce since 1973 in characterized by at least three distinct "wage regimes"—one from 1973 to 1995 that consisted of stagnant average wage growth and real wage reductions for the vast majority, one from 1995 into the early 2000s that was characterized by broad-based real wage growth, and one that encompasses the recovery starting in 2002 to 2003 and includes the recessionary period following 2007, a new period of stagnant real wages.

The data in **Table 4.3** and **Figure 4B** show wage trends for the 80 percent of employment consisting of either production workers in manufacturing or nonsupervisory workers in other parts of the private sector. This category includes factory workers, construction workers, and a wide variety of service-sector workers ranging from restaurant and clerical workers to nurses and doctors; it leaves out higher-paid managers and supervisors. These data allow us to start our analysis in 1947. (Note that Table 4.3 and Figure 4B refer to wages as "earnings," in keeping with how the Bureau of Labor Statistics describes the data.)

From 2007 to 2011 hourly wages of production/nonsupervisory workers grew 0.7 percent a year. In the business cycle from 2000 to 2007, hourly wages grew 0.5 percent per year, though growth was only 0.2 percent a year during the 2002–2007 recovery (not shown on Table 4.3). As discussed earlier, the momentum of the strong wage growth of the late 1990s carried over into the first few years of the 2000s. Annual wage growth over the entire 2000–2007 period was substantially less than the 1.4 percent annual growth of the 1995–2000 period.

The differences in trends between the early and latter parts of the 1989–2000 period are striking: Hourly wages fell 0.1 percent a year from 1989 to 1995 and then grew 1.4 percent a year from 1995 to 2000, a turnaround of 1.5 percentage points. The business cycles of the 1970s and 1980s were the most disappointing periods for wage growth, as real wages of production/nonsupervisory

Table 4.3 Hourly and weekly earnings of private production and nonsupervisory workers, 1947–2011 (2011 dollars)

	Real average earnings	
	Hourly	**Weekly**
1947	$10.67	$428.98
1967	16.79	636.48
1973	18.74	690.63
1979	18.31	651.82
1989	17.17	592.72
1995	17.08	586.44
2000	18.32	628.57
2007	18.91	640.23
2011	19.47	654.87
Annual percent change		
1947–1967	2.3%	2.0%
1967–1973	1.9	1.4
1973–1979	-0.4	-1.0
1979–1989	-0.6	-0.9
1989–2000	0.6	0.5
1989–1995	-0.1	-0.2
1995–2000	1.4	1.4
2000–2007	0.5	0.3
2007–2011	0.7	0.6
1979–2011	0.2	-0.1

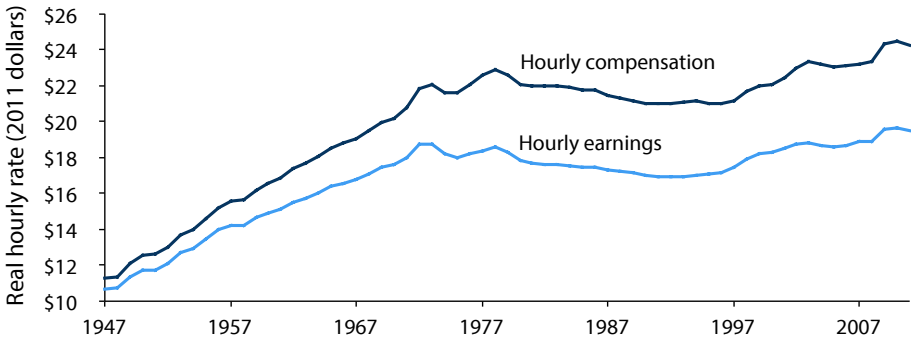
Note: Private production and nonsupervisory workers account for more than 80 percent of wage and salary employment.

Source: Authors' analysis of Bureau of Labor Statistics Current Employment Statistics

workers fell 0.6 percent annually from 1979 to 1989 and 0.4 percent annually from 1973 to 1979.

Over the longer term, from 1979 to 2011, wages were up only slightly, from $18.31 in 1979 to $19.47 in 2011, growth of just 0.2 percent per year over 32 years—virtually stagnant—despite some rapid growth in the late 1990s. This is in stark contrast to the early postwar trends: Between 1947 and 1967 real hourly earnings grew by 2.3 percent annually, and from 1967 to 1973 the growth was still a strong 1.9 percent each year. Figure 4B tracks the change in hourly wages and compensation of production/nonsupervisory workers over the entire period.

Figure 4B Real hourly earnings and compensation of private production and nonsupervisory workers, 1947–2011



Note: Private production and nonsupervisory workers account for more than 80 percent of wage and salary employment.

Source: Authors' analysis of Bureau of Economic Analysis National Income and Product Accounts data and Bureau of Labor Statistics Current Employment Statistics

Wages and compensation both grew strongly from 1947 to 1973 and then stagnated for typical workers after 1973 (other than in the late 1990s).

Table 4.3 also shows that the trend in weekly earnings corresponds closely to that of hourly earnings. However, weekly earnings grew more slowly (or fell faster) in each of the subperiods between 1947 and 1989 because weekly work hours declined. The weekly earnings of production and nonsupervisory workers in 2011 were $654.87 (in 2011 dollars), roughly similar to weekly earnings in 1979 and more than $35 less than in 1973.

Wage trends by wage level

For any given trend in average wages, particular groups of workers will experience different outcomes if wage inequality grows, as it has throughout approximately the last three decades. The pattern of inequality has shifted over time: Inequality grew across the board in the 1980s, and grew between the top and the middle throughout the 1990s and 2000s. This is why it is important to peer beneath the "average" and examine wage trends of groups of workers differentiated by occupation, education level, and so on. However, any analysis comparing different groups necessarily overlooks possible changes in inequality *within* the groups. This section examines wage trends by wage level, or percentile (the 60th percentile, for instance, is the wage at which a worker earns more than 60 percent of all earners but less than 40 percent of all earners), an analysis that has the advantage of capturing all of the changes in the wage structure. Though all of the wage shifts

can be noted by this analysis, the changes across groups (by education or age) and within groups (among those with particular education or ages) remain to be identified.

Table 4.4 provides data on wage trends for workers at each decile (every tenth percentile) in the wage distribution, thus allowing an examination of wage growth (or decline) of low-, middle-, and high-wage earners. Data are presented for the 95th percentile, the best measure of wages at the top of the wage structure that can be provided with these data (other data that can track wages in the top 1.0 percent and the top 0.1 percent are reviewed in a later section). The data are presented for the business cycle peak years of 1973, 1979, 1989, 2000, and 2007 as well as for 1995 (the point during the 1990s business cycle after which wages grew dramatically) and for 2011 (the last year for which data are available). The table also shows the percent change in wages over certain time periods. The

Table 4.4 Hourly wages of all workers, by wage percentile, 1973–2011 (2011 dollars)

	Wage by percentile*									
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**95**
Real hourly wage										
1973	$8.07	$9.75	$11.58	$13.47	$15.45	$17.72	$20.58	$23.53	$29.57	$37.10
1979	8.53	9.73	11.43	13.45	15.21	17.64	20.84	24.29	29.71	36.28
1989	7.29	9.08	10.89	13.01	15.12	17.66	21.01	25.12	31.72	38.99
1995	7.42	9.07	10.84	12.75	14.84	17.57	20.94	25.35	32.76	41.09
2000	8.24	10.15	11.85	13.71	15.99	18.92	22.43	27.25	35.62	45.44
2007	8.45	10.25	11.97	14.04	16.40	19.46	23.10	28.50	38.23	49.39
2011	8.16	9.86	11.74	13.88	16.07	19.03	23.00	28.80	38.49	49.74
Percent change										
1973–1979	5.7%	-0.1%	-1.3%	-0.2%	-1.6%	-0.5%	1.3%	3.2%	0.5%	-2.2%
1979–1989	-14.6	-6.7	-4.7	-3.3	-0.6	0.1	0.8	3.4	6.8	7.5
1989–2000	13.1	11.8	8.9	5.4	5.8	7.1	6.8	8.5	12.3	16.5
1989–1995	1.8	-0.1	-0.5	-2.0	-1.8	-0.5	-0.3	0.9	3.3	5.4
1995–2000	11.1	11.9	9.4	7.5	7.7	7.7	7.1	7.5	8.7	10.6
2000–2007	2.5	1.0	1.0	2.5	2.6	2.9	3.0	4.6	7.3	8.7
2007–2011	-3.4	-3.9	-1.9	-1.2	-2.0	-2.2	-0.5	1.0	0.7	0.7
1979–2011	-4.3	1.3	2.7	3.2	5.7	7.9	10.3	18.6	29.6	37.1

* The xth-percentile wage is the wage at which x% of the wage earners earn less and (100-x)% earn more.

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

bottom row presents the percent change in wages over the entire 1979–2011 period as a metric for assessing the longer-term trend; it uses 1979 as the last year of low unemployment (the cyclical peak) before the period of steady growth in wage inequality took hold.

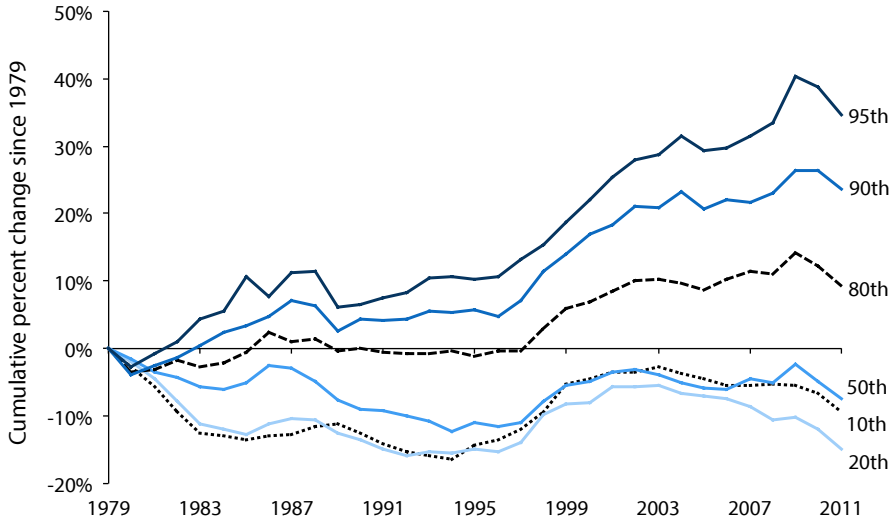
From 2007 to 2011 wages fell for the bottom 70 percent of the workforce and rose by 1 percent or less at the 80th, 90th, and 95th percentiles. Some of this erosion stems from higher inflation in 2011 driven by rising energy prices. However, the main cause of eroded real wages has been low nominal wage growth, the result of recessionary conditions. For instance, the median wage fell a total of 2.0 percent between 2007 and 2011, and no matter how low inflation would have been absent higher energy prices, there still would have been a decline in inflation-adjusted wages of the median worker between 2007 and 2011.

Wage growth was very modest in the prior business cycle from 2000 to 2007, with the median rising just 2.6 percent. As noted previously, all of the wage growth between 2000 and 2007 occurred in the first few years of that period and was due to the momentum from the fast wage growth of the late 1990s. Wage growth was significantly higher for wage earners at the 90th and 95th percentiles, who saw their wages grow 7.3 percent and 8.7 percent, respectively. On the other hand, low-wage workers at the 10th percentile had wage growth comparable to that of the median worker. Thus, from 2000 to 2007 wage inequality grew between the top and the middle but not between the middle and the bottom, as we will explore further.

Wages grew strongly across the board from 1995 to 2000, rising at least 7 percent at every wage level. Remarkably, the fastest growth—over 11 percent—occurred at the two bottom wage levels (the 10th and 20th percentiles). However, workers with the very highest wages, at the 95th percentile, saw almost comparable wage growth of 10.6 percent. Wages grew more slowly at every wage level from 2000 to 2007 compared with 1995–2000. Wage deceleration in the 2000s has been pervasive, especially since 2003.

The deterioration in real wages from 1979 to 1995 (looking at the 1979–1989 and 1989–1995 periods) was both broad and uneven. Wages were stagnant or fell for the bottom 60 percent of wage earners from 1979 to 1995 and grew modestly for higher-wage workers; the growth was just 3.4 percent at the 80th percentile from 1979 to 1989 and another 0.9 percent from 1989 to 1995. Wage growth at the 90th and 95th percentiles, however, was more than double that at the 80th percentile from 1979 to 1995. Starting in the early 1990s, low-wage workers experienced wage growth either more than or comparable to that of middle-wage workers, so that the wage gap between the middle and bottom lessened and then stabilized. Increases in the minimum wage in the early and late 1990s and the drop in unemployment in the late 1990s can explain this trend. For much of the last decade, the rates of wage growth for low- and middle-wage

Figure 4C Cumulative change in real hourly wages of men, by wage percentile, 1979–2011



Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

workers were about equal. Thus, the pattern of wage inequality since 1989 has generally been one of continual expanding of the wage gap between the highest earners and middle-wage earners but more or less parallel wage growth for low- and middle-wage workers.

This overall picture, however, masks different outcomes for men and women. **Figure 4C** shows the cumulative change in real hourly wages (relative to 1979) of men at key wage levels. The long-term pattern is that wages of median male workers and of low-wage men have been and remain below their 1979 levels despite strong wage growth in the late 1990s. In contrast, wages have improved modestly for men at the 80th percentile, growing just 9.3 percent over 32 years. High-wage men at the 90th and 95th percentiles did substantially better, with wages growing 23.6 percent and 34.6 percent, respectively. Figure 4C thus shows that low- and middle-wage men have fared comparably, and not so well, and that the wage gap between those at the top and those in the middle and bottom has expanded continuously over the last three decades, a theme explored throughout this chapter.

Table 4.5 provides the wage levels and changes in wages in relevant time periods for men at every wage decile in the same manner as Table 4.4 did for all workers. **Table 4.6** presents comparable wage data for women (women's wages are far lower than those of men at every decile; the gender wage gap is discussed in a later section). From 2007 to 2011, real hourly wages of most men declined,

Table 4.5 Hourly wages of men, by wage percentile, 1973–2011

	Wage by percentile*									
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**95**
Real hourly wage *(2011 dollars)*										
1973	$9.53	$12.23	$14.42	$16.53	$18.74	$21.24	$23.38	$26.90	$34.27	$41.30
1979	9.39	11.94	14.37	16.72	19.13	21.73	24.37	28.30	34.46	41.32
1989	8.35	10.45	12.83	15.19	17.68	20.81	24.07	28.20	35.33	43.87
1995	8.05	10.16	12.08	14.53	17.03	19.91	23.39	27.97	36.46	45.60
2000	8.97	10.99	13.14	15.57	18.21	21.18	24.93	30.25	40.30	50.46
2007	8.88	10.92	13.13	15.62	18.29	21.48	25.63	31.52	41.94	54.31
2011	8.52	10.16	12.45	14.95	17.72	20.76	25.00	30.93	42.58	55.61
Percent change										
1973–1979	-1.5%	-2.4%	-0.4%	1.1%	2.1%	2.3%	4.2%	5.2%	0.6%	0.1%
1979–1989	-11.1	-12.5	-10.7	-9.1	-7.6	-4.2	-1.2	-0.4	2.5	6.1
1989–2000	7.4	5.2	2.4	2.5	3.0	1.8	3.6	7.3	14.1	15.0
1989–1995	-3.6	-2.8	-5.8	-4.4	-3.7	-4.4	-2.8	-0.8	3.2	4.0
1995–2000	11.5	8.2	8.7	7.2	6.9	6.4	6.6	8.2	10.5	10.7
2000–2007	-1.0	-0.7	0.0	0.4	0.4	1.4	2.8	4.2	4.1	7.6
2007–2011	-4.1	-6.9	-5.2	-4.3	-3.1	-3.4	-2.4	-1.9	1.5	2.4
1979–2011	-9.3	-14.9	-13.3	-10.6	-7.4	-4.5	2.6	9.3	23.6	34.6

* The xth-percentile wage is the wage at which x% of the wage earners earn less and (100-x)% earn more.

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

with the median wage falling 3.1 percent and low-wage men losing from 4.1 to 6.9 percent. The fall in wages in this period was less among women, who experienced essentially stagnant wages at the median (down 0.2 percent) and losses of 2.8 percent and 0.4 percent, respectively, at the 20th and 10th percentiles. Wages eroded or stagnated among the bottom 80 percent of both men and women and rose among those in the upper 10 percent.

Among men over the 2000–2007 period, wages declined slightly or were relatively stagnant for the bottom 50 percent, but grew at least 4.0 percent at the 80th and 90th percentiles and 7.6 percent at the 95th percentile. Thus, the wage gap between the top and the middle continued to grow strongly from 2000 to 2007. This trend contrasts with the strong broad-based wage growth of the latter 1990s, when low-wage workers fared better than middle-wage workers. What makes the late 1990s remarkable is that the strong wage growth not only was lost afterwards but was preceded by many years of substantial wage erosion for

Table 4.6 Hourly wages of women, by wage percentile, 1973–2011

	Wage by percentile*									
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**95**
Real hourly wage *(2011 dollars)*										
1973	$6.71	$8.34	$9.39	$10.50	$11.83	$13.31	$15.00	$17.29	$21.38	$25.27
1979	8.14	8.82	9.58	10.68	11.99	13.63	15.18	17.66	21.98	25.98
1989	6.79	8.36	9.68	11.12	12.92	14.77	17.39	20.84	26.16	31.54
1995	7.10	8.46	9.89	11.38	13.07	15.06	17.89	21.86	28.10	34.92
2000	7.83	9.32	10.74	12.44	14.20	16.41	19.44	23.62	31.04	38.13
2007	7.99	9.52	10.96	12.87	14.91	17.33	20.61	25.54	33.62	41.92
2011	7.95	9.25	10.81	12.70	14.89	17.37	20.64	25.29	34.20	43.33
Percent change										
1973–1979	21.3%	5.8%	2.1%	1.8%	1.3%	2.4%	1.2%	2.1%	2.8%	2.8%
1979–1989	-16.6	-5.2	1.0	4.1	7.8	8.4	14.6	18.0	19.0	21.4
1989–2000	15.4	11.5	11.0	11.9	9.9	11.2	11.8	13.4	18.7	20.9
1989–1995	4.6	1.2	2.3	2.4	1.1	2.0	2.9	4.9	7.4	10.7
1995–2000	10.4	10.2	8.5	9.3	8.6	9.0	8.7	8.0	10.5	9.2
2000–2007	2.0	2.1	2.1	3.5	5.0	5.6	6.0	8.1	8.3	9.9
2007–2011	-0.4	-2.8	-1.3	-1.3	-0.2	0.2	0.2	-1.0	1.7	3.4
1979–2011	-2.3	4.8	12.9	18.9	24.2	27.5	36.0	43.2	55.6	66.8

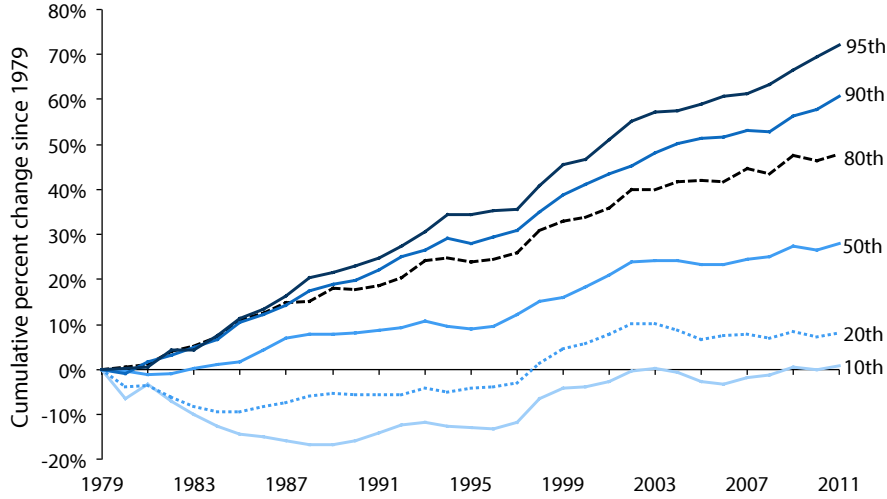
* The xth-percentile wage is the wage at which x% of the wage earners earn less and (100-x)% earn more.

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

middle- and low-wage workers. For instance, between 1979 and 1989, the median male hourly wage fell 7.6 percent, and low-wage (10th percentile) men lost 11.1 percent. In the early 1990s, across-the-board wage declines of roughly 3–6 percent affected the bottom 70 percent of male earners. The pattern of male wage deterioration shifted between the 1980s and the early 1990s; in the 1980s, wages fell most at the lower levels, while in the early 1990s wages eroded comparably in the middle and at the bottom. It is also noteworthy that 1979–1995 was a disappointing period even for high-wage men: At the 90th percentile they earned $34.46 per hour in 1979 and only 5.8 percent more, $36.46, in 1995. Thus, though high-wage men did relatively better than other men from 1979 to 1995, their absolute wage growth was minimal.

Figure 4D shows the cumulative percent change in real hourly wages (relative to 1979) of women at key wage levels. Wage growth for women has been stronger than for men at every wage level. Low-wage women at the 10th percentile were the

Figure 4D Cumulative change in real hourly wages of women, by wage percentile, 1979–2011



Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

only group to not experience any wage growth between 1979 and 2011, whereas the bottom 60 percent of men saw wage declines. As shown in Table 4.6, wages of the median woman grew by 24.2 percent from 1979 to 2011, with the gap between low- and middle-wage women's wages growing mostly in 1979–1995. Higher-wage women fared far better than middle-wage and lower-wage women for the entire period and had considerable improvement—66.8 percent and 55.6 percent, respectively—at the 95th and 90th percentiles.

Wages grew more among women than men over 2000–2007. They rose about 3–6 percent for the 40th to 70th percentiles and about 2 percent for the lowest-wage women at the 30th percentile and below (Table 4.6). The highest-wage women, those at the 95th percentile, enjoyed 9.9 percent wage growth in this period.

As with men, women's wages rose much more strongly across the board from 1995 to 2000 than in both the preceding and ensuing periods. It is notable that wage growth in this period was fairly even among all women, from 8.0 percent to 10.5 percent. In the earlier part of that same business cycle, from 1989 to 1995, wage growth was mediocre from the 20th to the 70th percentiles, ranging from about 1 percent to 3 percent. Wages grew more for the lowest-wage women, up 4.6 percent at the 10th percentile, reflecting the minimum-wage increases in those years. This was a sharp departure from the severe wage losses of low-wage

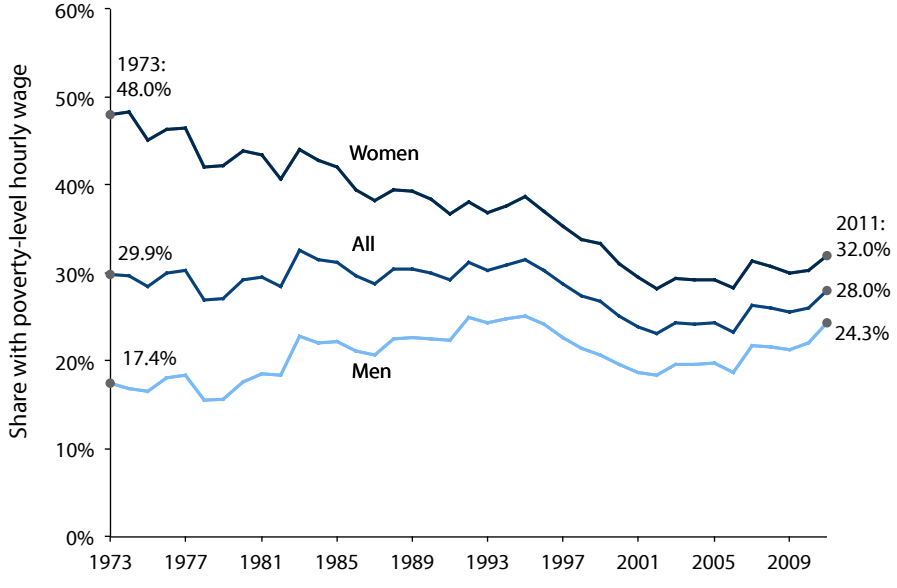
women in the 1980s. Higher-wage women fared the best in 1989–1995, as they did in nearly all other periods examined.

There were tremendous disparities in wage growth among women in the 1980s. Low-wage women at the 10th percentile experienced a very large wage decline of 16.6 percent, while those at the 20th percentile had a 5.2 percent loss. Not surprisingly, the value of the minimum wage fell tremendously during this same period. In contrast to the wage losses at the bottom, the wage of the median woman grew 7.8 percent and that of the highest-wage women grew roughly 20 percent.

Shifts in low-wage jobs

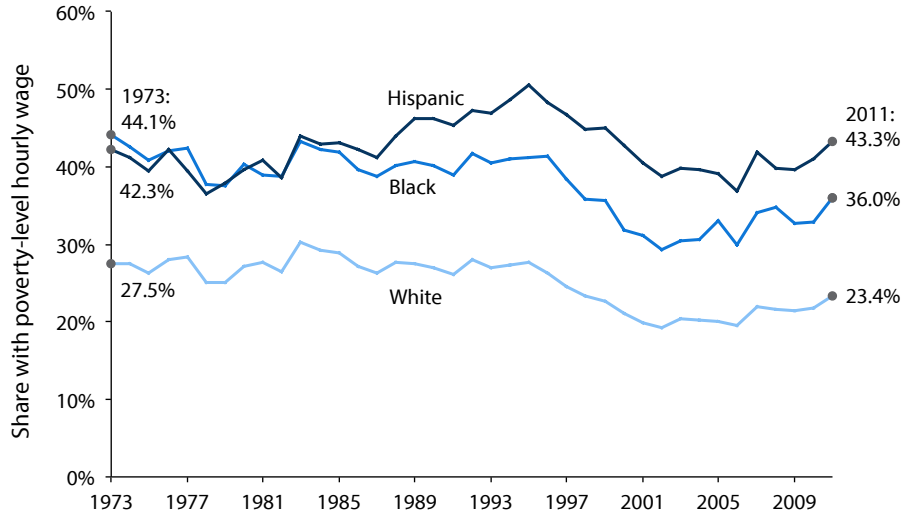
Another useful dimension of the wage structure to analyze is the proportion of workers earning low, or poverty-level, wages. **Figures 4E** and **4F** present these trends by gender and race/ethnicity, respectively. The measure presented in these figures is the share of workers earning equal to or less than the "poverty-level wage," the hourly wage that a full-time, year-round worker must earn to sustain a family of four at the official poverty threshold. The poverty wage was $11.06 in 2011 (in 2011 dollars), based on the official poverty level for a family of four

Figure 4E Share of workers earning poverty-level wages, by gender, 1973–2011



Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

Figure 4F Share of workers earning poverty-level wages, by race and ethnicity, 1973–2011



Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

in 2011 of $23,010. The poverty-level wage is roughly equal to two-thirds of the median hourly wage.

Women are much more likely to earn poverty-level wages than men. In 2011, 32.0 percent of women earned poverty-level wages or less, significantly more than the share of men (24.3 percent). Overall, 28.0 percent of workers, more than one in every four, earned poverty-level wages in 2011.

The trend in the share of workers earning poverty-level wages corresponds to the story outlined at the start of this chapter: Momentum in reducing poverty-wage jobs began in the late 1990s, then dissipated. The share of workers earning poverty-level wages has grown in the recessionary years among both men and women. The share of women earning poverty-level wages fell dramatically from 48.0 percent in 1973 to roughly 30 percent in 2000 and was relatively stable thereafter until the rise during the recent recessionary years. The story is different for men. They increasingly fell into low-wage work in the 1980s, a trend that was reversed in the late 1990s wage boom. But after the increase of the last few years, the share of men in low-wage work, at 24.3 percent in 2011, is substantially greater than in 1973, when just 17.4 percent of men earned low wages. The overall trends in the share of workers earning poverty-level wages are primarily driven by trends among women, since women are disproportionately the ones earning these low wages.

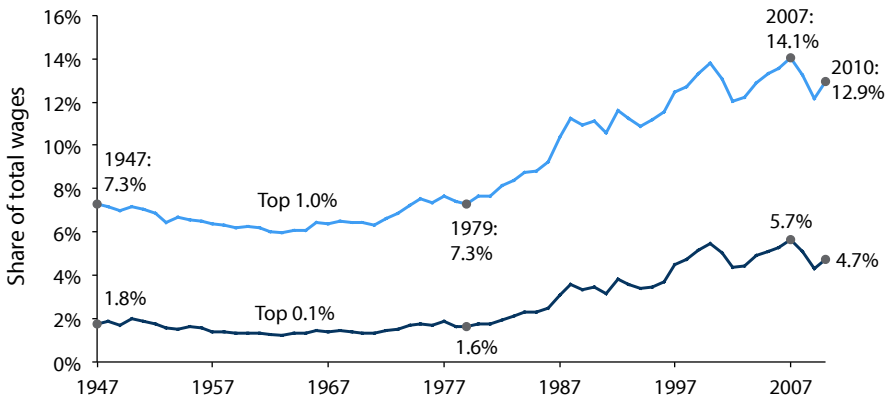
As seen in Figure 4F, the share of minority workers earning low wages is substantial—36.0 percent of black workers and 43.3 percent of Hispanic workers in 2011. Minority women are even more likely to be low earners—38.1 percent of black women and 47.3 percent of Hispanic women in 2011 (not shown in the figure). Figure 4F shows the decline from 1996 to 2002 in the share of white workers earning poverty-level wages and the bump up in the recent recessionary years. The decline in the shares earning poverty-level wages was steeper among both black and Hispanic workers in the late 1990s, reflecting the fact that persistent low unemployment disproportionately benefits disadvantaged and minority workers. That is also why the recent recession had a more adverse impact on black and Hispanic workers, sharply lifting the share earning low wages.

Trends year-by-year and by race/ethnicity and gender, plus trends in other wage groups (multiples of the poverty-level wage), are available on the State of Working America website at stateofworkingamerica.org/data/.

Trends among very high earners fuel growing wage inequality

Newly available data on the labor earnings of the very highest earners allow a look back to nearly the beginning of the last century, though the focus here is the period since 1947, and especially since 1979. The data cover annual earnings because they are drawn from the wage records in the Social Security system. Since these data are for annual wages and salaries, the trends reflect both changes in hourly wages, which we have been exploring, and changes in annual hours worked (based on changes in weekly hours and weeks worked per year).

Figure 4G Share of total annual wages received by top earners, 1947–2010



Source: Authors' analysis of Kopczuk, Saez, and Song (2010) and Social Security Administration wage statistics

Figure 4G presents the share of total annual wages received by the top 1.0 percent and top 0.1 percent of earners from 1947 through 2010. Wages shares of these and lower-earning groups are presented in **Table 4.7**. The average annual wages (see **Table 4.8**) of the top 1.0 percent and top 0.1 percent of earners, respectively, were $590,633 and $2,153,347 in 2010 (in 2011 dollars). Figure 4G shows that the top 1.0 percent of earners' share of earnings was relatively stable from 1947 into the 1970s but then nearly doubled, from 7.3 percent in 1979 to 14.1 percent in 2007, before declining during the recession to 12.9 percent in 2010 (the latest year of available data). The growth of the earnings share of those in the top 0.1 percent, the upper 10th of the top 1.0 percent, was even sharper over this period, more than tripling from 1.6 percent in 1979 to 5.7 percent in 2007 before falling to 4.7 percent in 2010. The erosion of the top earners' share of all earnings in the recession reflects the scaling back of stock options income (which is counted as wages) as the stock market declined in the wake of the financial crisis. As the stock market revived in 2010 the top earners started to regain some of the prior erosion in their share of earnings: In 2010 the top 1.0 percent

Table 4.7 Change in wage groups' shares of total wages, 1979–2010

	Share of annual wages					Change in share			
	1979	2004	2007	2009	2010	1979–2004	1979–2007	2007–2010	1979–2010
Bottom 90%	69.8%	62.5%	61.1%	62.3%	61.5%	-7.3	-8.8	0.5	-8.3
Bottom fifth	3.8	3.3	—	—	—	-0.5	—	—	—
Second fifth	9.4	8.1	—	—	—	-1.3	—	—	—
Middle fifth	15.6	13.6	—	—	—	-2.0	—	—	—
Fourth fifth	24.1	21.4	—	—	—	-2.8	—	—	—
Next tenth	17.0	16.1	—	—	—	-0.9	—	—	—
Top 10%									
90th to 99th percentile	22.8%	24.6%	24.9%	25.5%	25.6%	1.8	2.0	0.7	2.7
90th–<95th	10.8	10.9	10.8	11.2	11.2	0.1	0.1	0.4	0.4
95th–<99th	12.1	13.8	14.1	14.3	14.4	1.7	2.0	0.3	2.3
Top 1.0%	7.3%	12.9%	14.1%	12.2%	12.9%	5.6	6.7	-1.1	5.6
99th–<99.5th	2.6	3.3	—	—	—	0.8	—	—	—
99.5th–<99.9th	3.1	4.7	—	—	—	1.5	—	—	—
99.9th–100th (Top 0.1%)	1.6	4.9	5.7	4.3	4.7	3.3	4.0	-0.9	3.1

Source: Authors' analysis of Kopczuk, Saez, and Song (2010) and Social Security Administration wage statistics

Table 4.8 Change in annual wages, by wage group, 1979–2010 (2011 dollars)

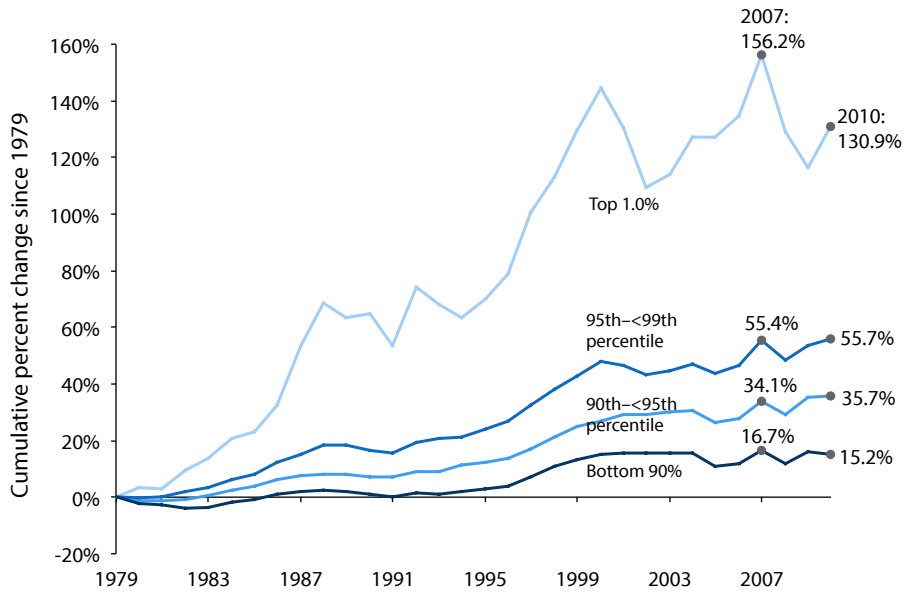
	Average annual wages (2011 dollars)					Change			
	1979	2004	2007	2009	2010	1979–2004	1979–2007	2007–2010	1979–2010
Bottom 90%	$26,276	$30,380	$30,653	$30,476	$30,278	16%	17%	-1%	15%
Bottom fifth	6,367	7,241	—	—	—	14	—	—	—
Second fifth	15,866	18,194	—	—	—	15	—	—	—
Middle fifth	27,239	30,791	—	—	—	13	—	—	—
Fourth fifth	42,178	48,240	—	—	—	14	—	—	—
Next tenth	59,300	72,732	—	—	—	23	—	—	—
Top 10%									
90th to 99th percentile	$88,681	$123,603	$128,873	$128,577	$129,752	39%	45%	1%	46%
90th–<95th	75,200	98,331	100,814	101,788	102,074	31	34	1	36
95th–<99th	105,531	155,194	163,947	162,063	164,350	47	55	0	56
Top 1.0%	255,792	581,047	655,251	553,069	590,633	127	156	-10	131
99th–<99.5th	179,613	299,779	—	—	—	67	—	—	—
99.5th–<99.9th	272,565	525,967	—	—	—	93	—	—	—
99.9th–100th (Top 0.1%)	569,590	2,207,706	2,634,121	1,946,058	2,153,347	288	362	-18	278

Source: Authors' analysis of Kopczuk, Saez, and Song (2010) and Social Security Administration wage statistics

regained 0.7 of the 1.9 percentage points lost from 2007 to 2009 (Table 4.7). Should the stock market continue to improve, it can be expected that the earnings share of the top 1.0 percent will return to near or above the share obtained in 2007. Even if top earnings do not return to the heights of 2007, the earnings share will clearly remain far above that of the mid-1990s and of the late 1970s. That is, we will certainly not see any major reversal of wage inequality between the top earners and the vast majority. This is the consequence of earnings growth of 131 percent for the top 1.0 percent compared with just 15 percent for the bottom 90 percent from 1979 to 2010 (Table 4.8).

Wages of the very highest earners have grown much faster than those of most workers. As **Figure 4H** shows, the growth of real annual wages of the bottom 90 percent from 1979 to 2007, before the recession began, was 16.7 percent. When the recent recessionary years are added, the bottom 90 percent's annual wages grew just 15.2 percent from 1979 to 2010. In contrast, wages grew 156.2 percent for the top 1.0 percent of earners between 1979 and 2007, nearly 10 times as fast as wage growth among the bottom 90 percent over the same period. Taking the recession into account, the top 1.0 percent had wage growth of 130.9 percent from 1979 to

Figure 4H Cumulative change in real annual wages, by wage group, 1979–2010



Source: Authors' analysis of Kopczuk, Saez, and Song (2010) and Social Security Administration wage statistics

2010. The top sliver (top 0.1 percent) of earners saw by far the fastest wage growth, enjoying a 278 percent increase from 1979 to 2010 (Table 4.8). In contrast, the group of earners from the 95th to the 99th percentile experienced wage growth of 55.7 percent from 1979 to 2010, less than half that of the top 1.0 percent though nearly four times that of the bottom 90 percent. These data thus illustrate a key characteristic of the wage inequality we have experienced over the last few decades: The gap between the vast middle of wage earners and the top earners has grown, but so has the gap between the top and the very top earners, with the upper one-thousandth (the top 0.1 percent) and the upper one-hundredth (the top 1.0 percent) faring far better than those just below them in the wage hierarchy. These growing wage gaps, between the top and the middle and between the very top and other top wage earners, represent two of the three key wage gaps that need to be explained in order to understand the growth of wage inequality.

One important cause of this fast growth of wages for the very highest wage earners is the rapid increase of corporate chief executive officers' pay, a subject explored in a later section.

Trends in benefit growth and inequality

The analysis in the preceding pages shows that real wages of a wide array of workers—high school graduates, college graduates, the median worker—have been flat since 2002 or 2003 depending upon the data series examined. In contrast, wages grew strongly between 1995 and 2002 or 2003, after declining or growing only minimally for the bottom 70 percent of wage earners after 1979. Also, total compensation (see the discussion of Table 4.2), the real value of both wages and fringe benefits, grew at the same pace as wages over the 1979–2011 period, though sometimes wages grew faster than compensation (as in the late 1990s) and sometimes more slowly (e.g., 2000–2007). Benefits grew faster than wages during much of the latter period, but since benefits make up a small share of compensation (18–20 percent), their growth was not associated with fast compensation growth overall. Fast growth in health care costs and pensions helped benefit growth exceed wage growth after 2000. In this section, we examine changes in health and pension coverage of different groups of workers and discuss another important benefit, paid leave.

Table 4.9 provides a breakdown of the growth in nonwage compensation, or benefits, using the Bureau of Labor Statistics Employer Costs for Employee Compensation data (the aggregate amounts appeared in Table 4.2). These data, based on a survey of employers, show that the value of total nonwage compensation, including health and pension/retirement plans and payroll taxes, remained over $5.00 per hour from 1987 to 1995. Following a 1.8 percent annual fall in the late 1990s, costs of health and pension/retirement plans ("voluntary benefits") grew rapidly (3.0 percent annually) in 2000–2007, with a net increase of $0.35 per

Table 4.9 Specific fringe benefits, 1987–2011 (2011 dollars)

	Voluntary benefits			Payroll taxes	Total nonwage compensation
	Pension	Health*	Subtotal		
Real hourly benefits					
1987	$0.91	$2.24	$3.15	$2.15	$5.30
1989	0.74	2.33	3.06	2.24	5.30
1995	0.76	2.10	2.86	2.32	5.18
2000	0.77	1.84	2.61	2.18	4.79
2007	0.95	2.26	3.21	2.40	5.60
2011	1.00	2.31	3.31	2.31	5.62
Annual dollar change					
1989–2000	$0.00	-$0.04	-$0.04	$0.00	-$0.05
1989–1995	0.00	-0.04	-0.03	0.01	-0.02
1995–2000	0.00	-0.05	-0.05	-0.03	-0.08
2000–2007	0.03	0.06	0.09	0.03	0.12
2007–2011	0.01	0.01	0.03	-0.02	0.00
Annual percent change					
1989–2000	0.4%	-2.1%	-1.5%	-0.2%	-0.9%
1989–1995	0.5	-1.7	-1.2	0.6	-0.4
1995–2000	0.3	-2.6	-1.8	-1.3	-1.6
2000–2007	3.0	3.0	3.0	1.3	2.3
2007–2011	1.4	0.5	0.8	-0.9	0.1

* Deflated by medical care price index
Note: Data are for March.

Source: Authors' analysis of Bureau of Labor Statistics National Compensation Survey–Employment Cost Trends

hour from 1995 to 2007. Note, however, that this 12.4 percent rise in voluntary benefit costs occurred at the same time that productivity grew 29.4 percent. Total nonwage compensation stagnated over the recessionary years from 2007 to 2011.

Table 4.9 also provides data on health and pension/retirement benefits per hour worked. It might be surprising to see that the real value of employer-provided health care benefits per hour worked has not grown appreciably since the late 1980s. It should be noted that health benefits in this table are adjusted for the inflation in medical care rather than for inflation in the average consumer basket of goods, because health care in the average consumer basket reflects

Table 4.10 Employer-provided health insurance coverage, by demographic and wage group, 1979–2010

	Health insurance coverage (%)						Change				
Group*	1979	1989	1995	2000	2007	2010	1979–1989	1989–2000	2000–2007	2007–2010	1979–2010
All workers	69.0%	61.5%	58.5%	58.9%	55.0%	53.1%	-7.4	-2.7	-3.9	-1.9	-15.9
Gender											
Men	75.4%	66.8%	62.6%	63.2%	58.4%	55.8%	-8.7	-3.6	-4.8	-2.6	-19.6
Women	59.4	54.9	53.3	53.6	51.8	49.9	-4.5	-1.3	-1.8	-1.9	-9.5
Race											
White	70.3%	64.0%	61.7%	62.7%	59.6%	57.8%	-6.3	-1.2	-3.2	-1.8	-12.5
Black	63.1	56.3	53.0	55.4	52.4	49.5	-6.8	-0.9	-3.0	-2.9	-13.6
Hispanic	60.4	46.0	42.1	41.8	37.3	36.3	-14.3	-4.3	-4.5	-1.0	-24.1
Education											
High school	69.6%	61.2%	56.3%	56.2%	51.1%	47.9%	-8.4	-5.0	-5.0	-3.2	-21.6
College	79.6	75.0	72.1	71.3	68.8	66.4	-4.6	-3.8	-2.5	-2.4	-13.3
Wage fifth											
Bottom	37.9%	26.4%	26.0%	27.4%	24.3%	20.5%	-11.5	1.0	-3.0	-3.8	-17.4
Second	60.5	51.7	49.5	50.9	45.9	43.6	-8.8	-0.8	-5.0	-2.3	-16.9
Middle	74.7	67.5	62.9	63.9	60.3	59.4	-7.2	-3.6	-3.6	-0.9	-15.3
Fourth	83.5	78.0	74.0	73.7	69.8	68.8	-5.5	-4.3	-3.9	-1.0	-14.6
Top	89.5	84.7	81.5	79.9	76.9	76.1	-4.7	-4.8	-3.0	-0.8	-13.4

* Private-sector wage and salary workers age 18–64 who worked at least 20 hours per week and 26 weeks per year

Source: Authors' analysis of Current Population Survey Annual Social and Economic Supplement microdata

out-of-pocket costs and not the costs to employers (therefore, the weight of health care in the overall basket is small). When examining changes in living standards, as we do in this table, it is important to be able to assess whether the amount of health care being purchased for a worker has grown, and that can only be achieved using a health-care-specific inflation measure. Pension benefits costs were stable in the 1990s, reflecting a shift to less-expensive, defined-contribution plans (discussed below)—but pension costs have grown steeply since 2000 and are responsible for most of the increase in benefit costs since 1989.

Table 4.11 Employer-provided pension coverage, by demographic and wage group, 1979–2010

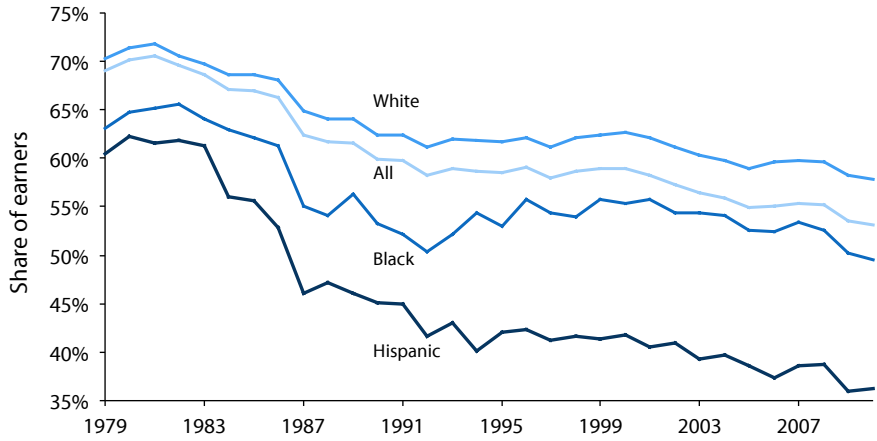
Group*	Pension coverage (%)						Change				
	1979	1989	1995	2000	2007	2010	1979–1989	1989–2000	2000–2007	2007–2010	1979–2010
All workers	50.6%	43.7%	45.8%	48.3%	44.6%	42.8%	-7.0	4.6	-3.7	-1.8	-7.8
Gender											
Men	56.9%	46.9%	48.6%	50.3%	45.4%	43.6%	-10.1	3.4	-4.9	-1.8	-13.3
Women	41.3	39.6	42.5	45.8	43.6	41.9	-1.7	6.2	-2.2	-1.7	0.6
Race											
White	52.2%	46.1%	49.5%	53.7%	50.3%	48.2%	-6.1	7.6	-3.4	-2.1	-3.9
Black	45.8	40.7	42.6	41.3	39.1	37.7	-5.1	0.7	-2.2	-1.4	-8.1
Hispanic	38.2	26.3	24.7	27.5	24.8	23.9	-11.9	1.2	-2.6	-0.9	-14.3
Education											
High school	51.2%	42.9%	43.2%	43.8%	38.8%	36.3%	-8.3	0.9	-5.0	-2.5	-14.9
College	61.0	55.4	58.8	63.7	58.2	56.1	-5.6	8.3	-5.4	-2.2	-4.9
Wage fifth											
Bottom	18.4%	12.7%	13.7%	16.3%	14.1%	13.7%	-5.7	3.6	-2.2	-0.4	-4.7
Second	36.8	29.0	32.0	35.8	31.6	31.6	-7.7	6.8	-4.3	0.0	-5.2
Middle	52.3	44.5	47.0	50.9	47.6	46.2	-7.8	6.4	-3.3	-1.4	-6.2
Fourth	68.4	60.0	63.2	64.8	59.9	57.2	-8.3	4.8	-5.0	-2.6	-11.1
Top	78.5	72.8	74.8	74.8	69.9	67.9	-5.8	2.1	-4.9	-2.0	-10.7

* Private-sector wage and salary workers age 18–64 who worked at least 20 hours per week and 26 weeks per year

Source: Authors' analysis of Current Population Survey Annual Social and Economic Supplement microdata

As Table 4.2 showed, inequality of compensation grew faster than that of wages between 1987 and 2007, which means that benefits inequality also grew faster than wage inequality. **Tables 4.10** and **4.11** examine changes in employer-provided health insurance and pension coverage, respectively, of different demographic groups and by wage fifth between 1979 and 2010 (the last year of available data). The share of workers covered by employer-provided health care plans—meaning covered by their own employer and not a spouse's employer—dropped a steep 15.9 percentage points, from 69.0 percent in 1979 to 53.1 percent in 2010 (Table 4.10). As **Figure 4I** illustrates, health care coverage eroded

Figure 4I Share of private-sector workers with employer-provided health insurance, by race and ethnicity, 1979–2010



Note: Sample is of private-sector wage-and-salary earners age 18–64 who worked at least 20 hours per week and 26 weeks per year. Coverage is defined as being included in an employer-provided plan for which the employer paid for at least some of the coverage.

Source: Authors' analysis of Current Population Survey Annual Social and Economic Supplement microdata

from 1979 until 1992, when it stabilized through the late 1990s, but began falling again after 2000.

The 5.8 percentage-point erosion of employer-provided health care coverage from 2000 to 2010 was driven by eroded coverage in every racial/ethnic, education, gender, and wage group. The erosion of coverage was larger among men (down 7.4 percentage points) than women (down 3.7 percentage points) and declined roughly 5.0 percentage points among whites, blacks, and Hispanics. Coverage eroded for both high school graduates (8.2 percentage points) but also among college graduates (4.9 percentage points). Health coverage declined for every wage group, with those in the bottom 40 percent of the wage structure losing more ground even though they had less to lose.

Over the longer period from 1979 to 2010, health care coverage declined about twice as much among men (down 19.6 percentage points) as among women (down 9.5 percentage points) and comparably among whites and blacks; Hispanics, though, suffered by far the largest drop—24.1 percentage points. The pattern in the erosion of health insurance coverage by wage level shows growth in inequality in the 1980s, with greater erosion the lower the wage. The 1990s, however, saw modest extensions of coverage for the bottom 20 percent, while erosion continued for middle- and high-wage workers. Coverage eroded for all wage groups from 2000 to 2007 and 2007 to 2010, and over the longer period,

1979–2010, employer-provided health insurance coverage declined considerably for each wage fifth, though somewhat more the lower the wage. Along education lines there is also evidence of growing inequality: Employer-provided health insurance coverage fell 21.6 percentage points among high school graduates but fell a smaller but still sizable 13.3 percentage points among college graduates (high school graduates were 12.6 percent less likely to have coverage than college graduates in 1979 but 27.8 percent less likely in 2010).

The impact of rising health care costs on wage growth—i.e., the extent to which rising health care expenses for employers came at the expense of wage growth—is explored later in this chapter, along with the potential impact on wage inequality over the last two decades.

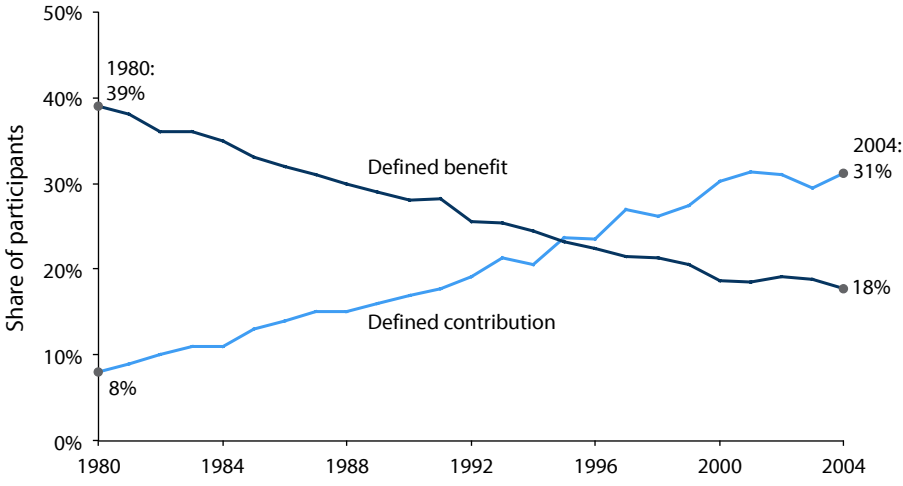
Employer-provided pension plan coverage (Table 4.11) eroded by 3.7 percentage points from 2000 to 2007 and another 1.8 percentage points between 2007 and 2010. This decline represents a sharp break from the 1990s, when pension coverage grew across the board (likely due to the increase in defined-contribution plans, as will be discussed shortly). In 2000 almost half the workforce (48.3 percent) had an employer-provided pension plan, a share nearly as large as in 1979. The recent erosion, however, lowered pension coverage to just 42.8 percent in 2010. The erosion since 2000 was widespread, occurring among both high school and college graduates and at every wage level. Among wage fifths, those with the highest wages and the highest coverage rates tended to lose the most ground since 2000 (they had more to lose). Much of the workforce now has very little pension coverage. Only 36.3 percent of high school graduates and just 31.6 percent of wage earners in the second fifth had coverage in 2010, and those in the bottom fifth had just 13.7 percent coverage. Less than a fourth of Hispanic workers and only 37.7 percent of black workers enjoyed employer-provided pension coverage in 2010. The coverage among men and women was comparably low in 2010, though men had much higher coverage than employed women back in 1979 or even in 1989. This is one area where we are seeing less inequality: Coverage among men has declined precipitously since 1979, while declines in recent years have returned women's coverage to its 1980s level.

From 1979 to 2010 pension coverage declined overall by 7.8 percentage points. The pattern by wage level shows coverage dropping relatively evenly across wage groups in the 1980s and rising across the board in the 1990s, with coverage expanding the most in the middle. Coverage declined across each wage fifth between 2000 and 2010 and over the entire 1979–2010 period. Lower-wage workers are now very unlikely to have jobs with employer-provided pension plans (as previously mentioned, only 13.7 percent were covered in 2010), and less than half of middle-wage workers have pension coverage. It should be noted that there was little coverage for low-wage workers to lose—just 18.4 percent for the bottom fifth and 36.8 percent for the second-lowest fifth in 1979. In 2010, the highest-wage workers were about 5.0 times as likely to have pension coverage as

the lowest-wage workers (67.9 percent versus 13.7 percent). Changes in pension coverage by education show growing inequality: Over the 1979–2010 period, pension coverage fell 14.9 percentage points among high school graduates but 4.9 percentage points among college graduates.

The widening coverage of employer-provided pension plans in the 1990s was most likely due to the expansion of 401(k) and other defined-contribution pension plans. These plans differ from defined-benefit plans, which are generally considered the best plans from a worker's perspective because they guarantee a fixed payment in retirement based on preretirement wages and years of service, regardless of stock market performance. Unfortunately, the latest data to examine these trends are for 2004. **Figure 4J** shows that a much larger share of workers are now covered by defined-contribution plans, in which employers make contributions (to which employees often 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. Therefore, the shift from traditional defined-benefit plans to defined-contribution plans represents an erosion of pension quality. Figure 4J shows a dramatic erosion in the share of workers covered by defined-benefit plans, a decline from 39 percent in 1980 to just 18 percent in 2004. Correspondingly, the share of workers with a defined-contribution plan (and no other plan) rose from

Figure 4J Share of pension participants in defined-contribution and defined-benefit plans, 1980–2004



Note: Data are for private-sector workers.

Source: Authors' analysis of Center for Retirement Research (2006)

8 percent to 31 percent. Chapter 6 provides further discussion of pensions and retirement assets and income.

Table 4.12 broadens our discussion of benefits to focus on various types of paid leave such as sick leave, family leave, holidays, and vacation. Such leave is embedded in the wage data presented in this chapter, as workers surveyed report wages based on the days for which they were paid and not just for days worked. This table, therefore, surfaces the fact that access to such leave is very unequal and, for those who have such leave, there is great inequality in the leave that is provided. For instance, the top panel shows that only 67 percent of civilian workers (including all private-sector workers and state and local government workers but excluding

Table 4.12 Share of workers with paid leave, by wage group, 2011

	Percent with access to:			
	Paid sick days	Paid vacation	Paid family leave	Number of paid holidays*
All	67%	74%	12%	8
By wage				
Bottom 10 percent	23%	40%	4%	5
Lowest quarter	36	53	5	6
Second quarter	69	83	11	8
Third quarter	79	89	14	9
Top quarter	88	78	19	10
Top 10 percent	90	75	20	10
By union status				
Union	84%	74%	15%	10
Nonunion	64	74	11	8

	Number of paid sick days by length of service*				Number of vacation days by length of service*			
	1 yr	5 yrs	10 yrs	20 yrs	1 yr	5 yrs	10 yrs	20 yrs
All	9	9	10	10	10	14	17	19
Union	10	11	11	12	10	14	17	21
Nonunion	8	9	9	10	10	14	17	19

* For those with such paid leave

Note: Data are for civilian workers, defined as workers in the private sector and state and local government but not the federal government.

Source: Authors' analysis of Employee Benefits Survey tables (Bureau of Labor Statistics 2011)

federal workers) were provided any paid sick leave, and far fewer, just 12 percent, were provided any paid family leave. Paid vacations are more prevalent, with 74 percent of workers eligible. The great disparities in the provision of paid leave are revealed in the breakdowns of access by wage level. Only 23 percent of those in the bottom 10 percent of the wage scale were provided paid sick leave, compared with 90 percent among the top 10 percent of earners. In short, the higher the wage, the more likely a worker is to be provided paid sick leave. Paid family leave follows that same pattern, though the provision is far less than for paid sick leave at every wage level. Only 4 percent of workers in the bottom 10 percent of the wage structure had paid family leave, while 20 percent of those in the top 10 percent did.

The average worker is paid for eight holidays (Table 4.12), which is two fewer than the number of federal holidays each year. Those at the bottom of the wage structure enjoy five or six paid holidays on average, while those at the top have about twice as many paid holidays (10).

Table 4.12 also provides a breakdown of access to paid leave by union status. Unionized workers are more likely to have paid sick days (84 percent) than nonunion workers (64 percent), a bit more likely to have paid family leave, and equally likely to have paid vacation (74 percent). Union workers average 10 paid holidays, two more than the average nonunion worker.

Table 4.12 also has data on the number of paid sick and vacation days provided for workers at different lengths of service. (The data are only for those workers who are provided these types of paid leave.) Those provided paid sick leave have nine days provided early in their tenure, and starting at 10 years they receive an additional 10th paid sick day. Union workers have two more days of paid sick leave at each length of service when compared with nonunion workers. Vacation days rise more with service, starting at 10 days for those with just one year of service and reaching 19 days for those with 20 years of service. Union and nonunion workers who receive paid vacation have a comparable amount of leave except for very senior workers, among whom union workers enjoy a bit more (an additional two days) vacation time.

Dimensions of wage inequality

In this section we shift the discussion from describing wage and benefit trends to focusing on the many dimensions of one of the key wage trends: growing wage inequality. To explore the factors behind wage inequality, we first need to understand which particular groups are faring well or poorly compared with others, and how these wage gaps have changed over time.

The data presented up to this point have shown the stagnation of wages and overall compensation between 1979 and 1995 and the strong wage growth in the late 1990s that carried into the 2000s but waned after 2002 or 2003. **Table 4.13** and related figures present key wage differentials, by gender (excluding race and

Table 4.13 Dimensions of wage inequality, by gender, 1973–2011

		Wage gap*							Change				
		1973	1979	1989	1995	2000	2007	2011	1973–1979	1979–1989	1989–2000	2000–2007	2007–2011
A. Total wage inequality **													
90/10 (x/y)	Men	128.0%	130.0%	144.3%	151.1%	150.3%	155.3%	160.9%	2.0	14.3	6.0	5.0	5.7
	Women	115.9	103.2	134.9	137.6	137.7	143.7	145.9	-12.7	31.8	2.8	6.0	2.1
90/50	Men	60.3	58.8	69.2	76.1	79.5	83.0	87.7	-1.5	10.4	10.2	3.6	4.7
	Women	59.2	60.6	70.5	76.5	78.2	81.3	83.2	1.4	9.9	7.7	3.1	1.9
50/10	Men	67.6	71.1	75.1	75.0	70.8	72.3	73.3	3.5	3.9	-4.2	1.4	1.0
	Women	56.7	42.5	64.4	61.1	59.5	62.4	62.7	-14.2	21.9	-4.9	2.9	0.2
B. Between-group inequality*													
Education													
College/high school	Men	25.1%	20.2%	34.0%	37.1%	42.0%	44.1%	44.8%	-4.9	13.8	8.0	2.1	0.7
	Women	36.5	25.0	40.0	46.7	47.9	48.5	48.7	-11.5	15.0	7.9	0.6	0.2
High school/less than high school	Men	22.3	22.0	22.1	26.5	26.0	25.2	28.7	-0.3	0.1	3.9	-0.7	3.4
	Women	26.2	21.3	26.4	29.8	29.5	27.7	26.2	0.0	0.1	0.0	0.0	0.0
Experience**													
Middle/young (35 yrs/25)	Men	22.0%	21.5%	25.7%	26.9%	22.9%	24.3%	27.5%	-0.5	4.1	-2.8	1.4	3.2
	Women	8.0	9.5	17.8	21.7	18.4	20.9	22.4	1.5	8.3	0.6	2.5	1.5
Old/middle (50 yrs/35)	Men	3.4	8.2	12.4	12.7	8.8	9.4	11.8	4.7	4.3	-3.7	0.7	2.4
	Women	-2.0	0.4	2.1	5.3	4.7	8.3	8.6	2.4	1.7	2.5	3.7	0.3
C. Within-group inequality**													
	Men	42.3%	42.8%	46.7%	47.8%	48.1%	50.1%	50.7%	1.4%	9.0%	3.0%	4.2%	1.1%
	Women	41.8	40.2	44.7	46.7	45.8	48.4	48.5	-3.8	11.4	2.4	5.7	0.2

* Log wage differential
** Log wage ratio of x/y
*** Simple human capital regression of log wages; see table notes
**** Ratio x/y
***** Mean square error from same regressions as education and experience

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

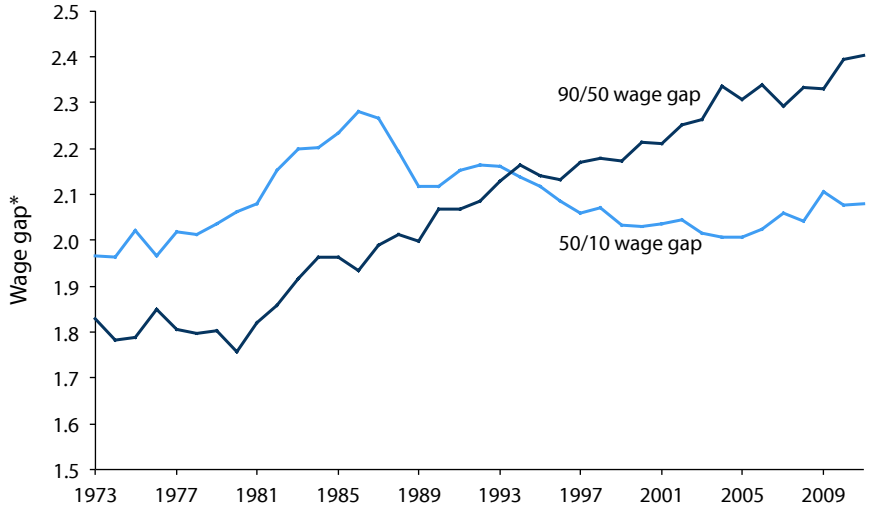
gender differentials), from 1973 to 2011. Any explanations of growing wage inequality (covered later) must be able to explain the movement of these wage differentials.

Gaps between higher- and lower-wage workers

The top section of Table 4.13 shows the trends in the 90/10 wage differential and its two components, the 90/50 and 50/10 wage differential. These differentials reflect the growth in overall wage inequality and follow the wage levels presented in Tables 4.5 and 4.6. The 90/10 wage gap, for instance, shows the degree to which high-wage workers—defined here as those who earn more than 90 percent but less than 10 percent of the workforce—fared better than low-wage workers, defined here as those who earn at the 10th percentile. 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. For example, men at the 90th percentile in 2011 earned wages 160.9 percent greater than those of men at the 10th percentile. (These differentials are presented in "logged" differentials to place them on the same scale as other differentials presented in the table, which are drawn from wage regressions using logged wages as the dependent variable.)

The values (not "logged") of the 90/50 and 50/10 wage gaps of men and women, respectively, are shown in **Figures 4K** and **4L** (in both figures as a ratio

Figure 4K Wage gaps among men, 1973–2011

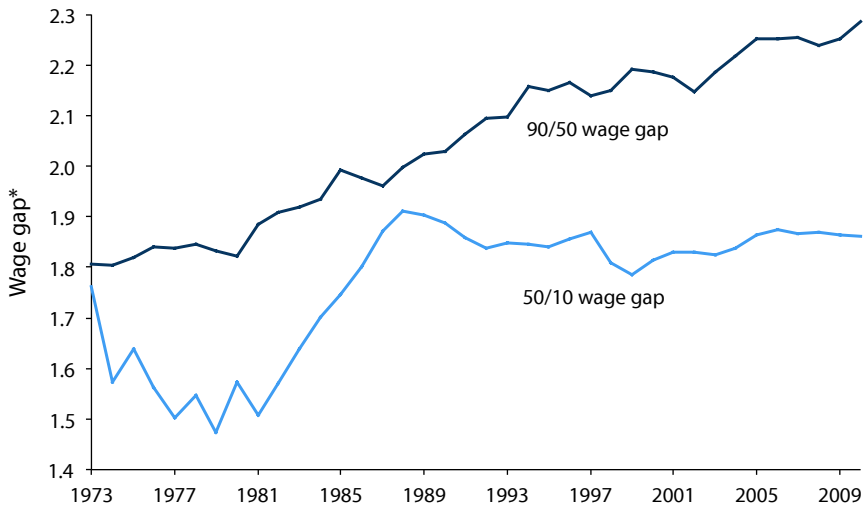


* Ratio of workers' wages at the higher earnings percentile to workers' wages at the lower percentile

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

of wages at the higher to lower percentiles). As the figures show, wage inequalities have grown since 1979, although the patterns differ across time periods. For instance, among both men and women the pattern of growing inequality through most of the 1980s (through about 1987–1988) differed from the pattern thereafter. From 1979 to 1989 (as we saw in the analysis of wage deciles in Tables 4.4 through 4.6), there was a dramatic across-the-board widening of the wage structure, with the top pulling away from the middle and the middle pulling away from the bottom. In the late 1980s, however, the wage gap in the bottom half of the wage structure, as reflected in the 50/10 ratio, began shrinking among men, stabilized in the early 1990s, then shrank until the mid-2000s, when it proceeded to grow again. Among women the 50/10 wage gap grew sharply until the late 1980s but has been relatively stable since then. On the other hand, the 90/50 wage gap among both men and women continued to widen throughout the 1980s, 1990s, and 2000s. This widening of the wage gap at the top is even more pronounced between wage earners at the 95th and 50th percentiles, as shown in **Figure 4M**. (The 95th percentile is the highest wage we can track in these data with technical precision. However, the Social Security data on annual earnings presented in Table 4.8 show a widening inequality between the very top earners in the top 1.0 and top 0.1 percent, and wage earners in the rest of the top 10 percent.)

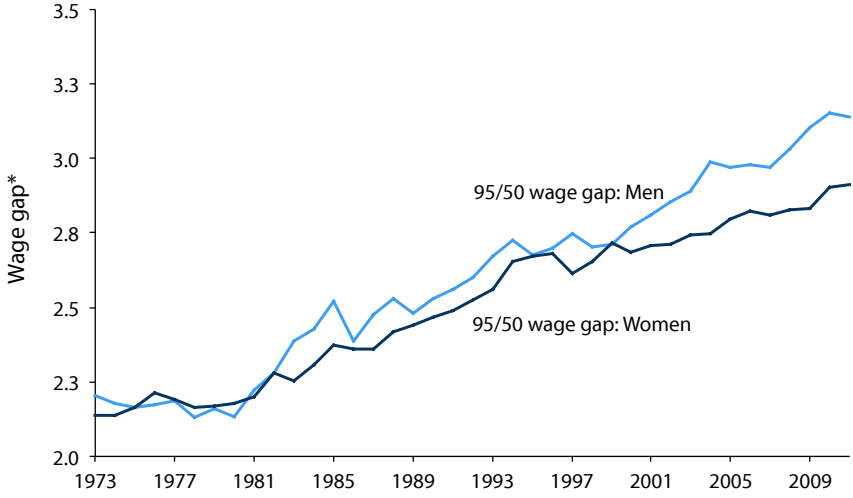
Figure 4L Wage gaps among women, 1973–2011



* Ratio of workers' wages at the higher earnings percentile to workers' wages at the lower percentile

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

Figure 4M Wage gap between the 95th and 50th percentiles, by gender, 1973–2011



* Ratio of workers' wages at the 95th earnings percentile to wages at the 50th percentile

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

These disparate trends between high- versus middle-wage growth and middle- versus low-wage growth should focus attention on how causal factors affect particular portions of the wage structure—very top, top, middle, or bottom—rather than on how causal factors affect inequality generally. This break in trend in the late 1980s (when inequality in the bottom half stopped expanding and started falling among men, and stopped expanding and began stagnating among women) raises the possibility of a differing mix of factors increasing overall inequality in the 1980s and thereafter, or a shift over time in the impact of a particular factor, such as technology or globalization (we will visit this issue when we examine the impact of both trade and technology).

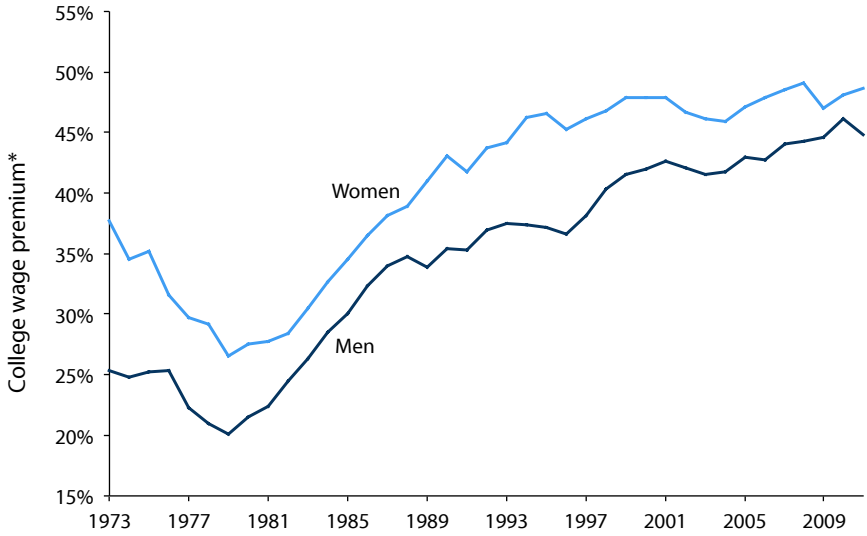
The trends in recent years, 2000–2011, may signal a return to the 1980s pattern of an across-the-board widening of wage inequality (even if the overall wage gap at the bottom has grown modestly). At the top, the wage gap (95/50 or 90/50) has grown more sharply among men but has continued its growth among women as well (see Figure 4M for the 95/50 gap by gender). Overall wage inequality, measured by the 90/10 ratio, grew more rapidly among men and women from 2000 to 2011 than in the 1990s.

Gaps between workers with different education and experience levels

Analysts decompose, or break down, growing wage inequality into two types of inequality—"between group" and "within group." In addition to depicting total wage inequality, Table 4.13 presents trends in two types of "between group" inequalities: the growing wage differentials between groups of workers defined by their *education* levels and by their labor market *experience* (measured as x/y where the wage of x exceeds the wage of y). The most frequently discussed differential is the "college wage premium"—the wage gap between (four-year) college graduates and high school graduates. In this analysis the premiums discussed, such as the college premium, are "regression-adjusted," which means that the analysis controls for the impact of other factors such as experience, marital status, race, ethnicity, and region of residence. Thus, the education premium presented here will differ from one computed by simply dividing the college wage by the high school wage (because the calculation here takes account, for instance, of the differing age and racial distribution of each group).

The college wage premium (see **Figure 4N**) fell in the 1970s among both men and women but exploded in the 1980s, growing about 14 percentage points for

Figure 4N College wage premium, by gender, 1973–2011



* Percent by which wages of college graduates exceed those of otherwise equivalent high school graduates, regression adjusted

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

each. Growth then slowed after 1989. The pattern of growth of this key education differential in the 1990s and beyond, however, differed between men and women. Among men the college premium grew only modestly in the early 1990s—year-by-year trends (discussed later) show it to be relatively flat between 1988 and 1996—but it grew strongly thereafter until 2001 and modestly from 2001 until 2011. Thus, the 1990s growth in the college premium for men primarily occurred in the last few years of that period, with modest growth since 2001. Among women, however, the college wage premium grew steadily but modestly in the early 1990s and then was relatively stable after 1995 through 2011 (a modest growth of 2.0 percentage points over those 16 years).

Table 4.13 also presents the trends in another education differential—between those completing high school and those without high school degrees, the "high school premium." This differential would be expected to affect the wage distribution in the bottom half, as less than 10 percent of the workforce has less than a high school education, and high school graduates make up about a third of the workforce (as will be discussed later). The high school premium has been remarkably stable, especially relative to the trends in the college premium. Among men the high school premium ranged from 22.0 percent to 26.5 percent from 1973 through 2007. The bump up of the high school premium from 2007 to 2011 may reflect the hard times in construction, which provided decent wage opportunities for men lacking a high school degree. Among women the high school premium rose in the 1980s (after falling in the 1970s) and increased again in the 1990s. But it has fallen in value since 2000 and in 2011 was about the same as in 1989 (and 1973).

One reason for the relative stability of the high school premium is that, even as having a high school degree was becoming more economically valuable, the share of workers without a high school degree dramatically declined. It may also be the case that growth of the "high school wage" was diminished because a larger share of workers completing high school (which is our measure here) have an equivalency degree rather than a traditional diploma. Nevertheless, since this wage differential grew modestly among men over the last 30 years, one can conclude that this education differential has not been a driving force behind the changes in the 50/10 wage gap among men (which grew in the 1980s and declined thereafter). Among women, the wage gap between middle- and low-wage workers was far higher in 2011 than in 1979, yet the high school premium has only grown modestly. This suggests that changing wage differentials at the bottom among women are only weakly, at best, related to changing education differentials.

Experience, or age, is another way of categorizing "skill." Experience differentials reflect the wage gaps between older and middle-aged and younger workers. Among men, at least since 1979, there has not been any sizable increase in experience differentials, although young men's wages fell relative to those of middle-aged men in the recent recessionary years. Among women, however, experience

differentials have grown between older and middle-aged women and between middle-aged and younger women. Most of the deterioration of younger women's wages relative to those of middle-aged women developed in the 1980s, consistent with the rapid decline in value of the minimum wage (which would affect younger women heavily). The wage gap between older and middle-aged women workers grew over 1973–1995 and then again in 2000–2007.

The gap between workers with comparable education and experience

Within-group wage inequality—wage dispersion among workers with comparable education and experience—has been a major dimension of growing wage inequality. Unfortunately, most discussions of wage inequality focus exclusively on the between-group dimensions discussed earlier, even though within-group wage inequality is by far the most important dimension of wage inequality's growth. The growth of within-group wage inequality is presented in the last section of Table 4.13, with changes measured in percent. These data show that within-group inequality grew slightly among men in the 1970s and 1990s but grew strongly in the 1980s (9.0 percent) and the 2000s (over 5.0 percent). Among women, within-group inequality fell in the 1970s, grew by 11.4 percent in the 1980s, grew by a modest 2.4 percent in the 1990s, and grew a bit more rapidly in recent years. Within-group inequality is explored further in Tables 4.19 and 4.20.

The measure of within-group wage inequality in Table 4.13 is a "summary measure" describing changes across the entire wage distribution. Within-group wage inequality reflects the changes in wages among workers with similar attributes such as education and experience, so it can be thought of as aggregating the inequalities among young college graduates and middle-aged high school graduates and so on. Unfortunately, such a measure does not help us understand changes in particular measures of wage inequality, such as the 90/50 and 50/10 differentials presented in the top portion of the table. This shortcoming is particularly troublesome for an analysis of the period after the late 1980s, in which inequalities were expanding at the top (i.e., the 90/50 differential) but shrinking or stable at the bottom (i.e., the 50/10 differential). A summary measure of inequality by definition reflects the net effect of the two disparate shifts in wage inequality since the late 1980s, and probably as a result the change in within-group wage inequality from 1989 to 2011 appears small. But it is clear that within-group wage inequality grew substantially in the 1980s.

Since changes in within-group wage inequality have been a significant factor in various periods, it is important to be able to explain and interpret these trends. In a later section, we show that over half of the growth of wage inequality since 1979 has been from growing within-group inequality. 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 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 now turn to a more detailed examination of between-group wage differentials such as education, experience, and race/ethnicity, as well as an examination of within-group wage inequality.

Rising education/wage differentials

Changes in the economic returns to education affect the structure of wages by changing the wage gaps between different educational groups. The growth in "education/wage differentials," or premiums, has led to greater wage inequality since 1979 but to a different degree in each decade (see Table 4.13 and Figure 4N). The rise of the college premium helps to explain the relatively faster wage growth among high-wage workers. Changing education/wage differentials, it should be noted, are not causal in and of themselves. After all, a change in the minimum wage can affect the wage gap between high school graduates and those lacking a high school degree. In this light, examining education/wage differentials is an intermediate step in examining the factors that have generated wage inequality. This section examines wage trends among workers at different levels of education and begins the discussion, carried on through the remainder of the chapter, of the causes of rising education/wage differentials and of overall wage inequality.

Table 4.14 presents the wage trends and employment shares (percentage of the workforce) of workers at various education levels from 1973 to 2011. It is common to point out that the wages of "more-educated" workers have grown faster than the wages of "less-educated" workers since 1979, with the real wages of less-educated workers generally falling sharply (or rising more slowly from 1995 to 2000). This pattern of wage growth is frequently described in terms of a rising differential, or premium, between the wages of the college-educated and high school–educated workforces (as shown earlier in Table 4.13).

The frequent categorizing of workers as either "less educated" (and faring relatively poorly) or "more educated" (and faring relatively better) is potentially misleading. As we will show shortly, in some periods the better-educated workers do not fare so well. Moreover, the group labeled "less educated" actually comprises about 70–75 percent of the workforce during most of this period and has skills and education levels that exceed those of most workers in the world. As the table shows, in 2011 the share of the U.S. workforce age 18–64 lacking a high school degree or an equivalent degree was just 8.4 percent. Last, it is notable that the college-educated group consists of two groups: one with just four years of college, and another more-educated group (advanced degree); the wage trends of these two groups have frequently diverged, so it makes sense—in fact, it is absolutely necessary—to examine them separately.

Wages have grown far more slowly for every education group since 2000 than in the late 1990s. The contrast is even starker when one looks at the wage growth during the 2002–2007 recovery after the wage momentum from the late 1990s had subsided (as seen in Figure 4A earlier) and the jobless recovery took hold, as well as during the recessionary years after 2007, when wages fell for every group except for those with advanced degrees (whose wages rose a scant 0.1 percent each year). These are disappointing outcomes for a period since 2000 when there was such fast productivity growth.

Table 4.14 Hourly wages by education, 1973–2011 (2011 dollars)

	Less than high school	High school	Some college	College degree	Advanced degree
Real hourly wage					
1973	$14.93	$17.11	$18.43	$24.96	$30.17
1979	14.85	16.67	17.82	23.36	28.53
1989	12.69	15.47	17.37	24.36	31.40
1995	11.46	15.15	16.93	25.16	33.10
2000	11.92	16.04	18.23	27.99	35.42
2007	12.34	16.24	18.31	28.65	36.31
2011	11.82	15.89	17.57	27.99	36.40
Annual percent change					
1973–1979	-0.1%	-0.4%	-0.6%	-1.1%	-0.9%
1979–1989	-1.6	-0.7	-0.3	0.4	1.0
1989–2000	-0.6	0.3	0.4	1.3	1.1
1989–1995	-1.7	-0.3	-0.4	0.5	0.9
1995–2000	0.8	1.1	1.5	2.2	1.4
2000–2007	0.5	0.2	0.1	0.3	0.4
2007–2011	-1.1	-0.5	-1.0	-0.6	0.1
Share of employment					
1973	28.5%	38.3%	18.5%	10.1%	4.5%
1979	20.1	38.5	22.8	12.7	6.0
1989	13.7	36.9	26.0	15.6	7.9
2000	10.8	31.9	29.8	18.8	8.7
2007	9.8	29.6	29.6	20.9	10.1
2011	8.4	28.0	30.4	21.9	11.3

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

Over the 1979–2007 period, the simple story is that the greater the education level of the group, the more wages rose, although the extent of the differences varied across particular time periods. From 1979 to 1995 the wages of those with less than a college degree actually declined, while those of college-educated workers rose modestly (Table 4.14). It is notable that this group of workers with less than a four-year college degree who saw falling wages from 1979 to 1995 comprised more than three-fourths of the workforce in 1989. Between 1995 and 2000 (up until 2002 actually) real wages grew for all educational groups while, as just discussed, after 2002 wages failed to grow for those with a high school education or at most a college degree. One interesting pattern to note is that those with advanced degrees (master's degrees, professional degrees in law, medicine, and so on) sometimes saw their wages grow faster than those with just a college degree (1979–1989, 1989–1995) but sometimes saw slower wage growth (1995–2000) and sometimes comparable growth (2000–2007).

The increased wage differential between college-educated workers (referring to those with a college degree but no further degree) and those with less education is frequently ascribed to a relative increase in employer demand for workers with greater skills and education. This interpretation follows from the fact that the wages of college-educated workers increased relative to others' wages despite an increase in their relative supply, from 12.7 percent of the workforce in 1979 to 20.9 percent in 2007. That is, since, all else being equal, the increased relative supply of college-educated workers would be expected to reduce the college wage, the relative increase of the college wage implies strong growth in employer demand for more-educated workers, presumably reflecting technological and other workplace trends.

This interpretation correctly concludes that there has been a rising relative demand for college graduates in the last 30 years or so. However, demand also increased during the preceding 30 years, when wage inequality did not rise. As we will explore below, rising relative demand, driven by technology, can be the cause of rising education differentials and wage inequality if the growth of relative demand accelerated, i.e., was faster recently than in the past.

Yet an increased relative demand for educated workers is only a partial explanation, especially if it is credited to a benign process of technology or other factors that lead to a higher value for education and thus bid up the wages of more-educated workers. Note, for instance, that the primary reason for an increased wage gap between college-educated and other workers is the precipitous decline of wages among the non-college-educated workforce from 1979 to 1995 and not any strong growth in the college wage (it increased a modest 0.4 percent or 0.5 percent annually in this time period). Moreover, as discussed below, there are many important factors generating education differentials that may not reflect technology-driven changes in the relative demand for education and skill; these might include high unemployment, the shift to low-wage industries, declining unionization, a falling minimum wage, and import competition.

Tables 4.15 and **4.16** present trends in wage and employment shares of men and women in each education group. Among men, as with all workers, real wages declined in the recessionary years after 2007 in every education group, including college graduates, except for those with advanced degrees, whose wages were basically stagnant. Wage growth from 2000 to 2007 was modest, especially compared with the faster wage growth for each education group in the late 1990s. Wages of those with a college degree or less either stagnated or declined during the recovery years from 2002 to 2007 (not shown in the table). The exceptionally strong wage

Table 4.15 Hourly wages of men, by education, 1973–2011 (2011 dollars)

	Less than high school	High school	Some college	College degree	Advanced degree
Real hourly wage					
1973	$17.45	$20.69	$21.15	$28.54	$31.70
1979	17.13	20.08	20.88	27.29	31.06
1989	14.39	17.95	19.80	27.93	34.73
1995	12.61	17.08	19.03	28.30	36.65
2000	13.08	18.09	20.62	31.77	39.71
2007	13.37	18.03	20.45	32.78	41.17
2011	12.71	17.53	19.45	31.81	41.34
Annual percent change					
1973–1979	-0.3%	-0.5%	-0.2%	-0.7%	-0.3%
1979–1989	-1.7	-1.1	-0.5	0.2	1.1
1989–2000	-0.9	0.1	0.4	1.2	1.2
1989–1995	-2.2	-0.8	-0.7	0.2	0.9
1995–2000	0.7	1.2	1.6	2.3	1.6
2000–2007	0.3	0.0	-0.1	0.4	0.5
2007–2011	-1.3	-0.7	-1.3	-0.8	0.1
Share of employment					
1973	30.6%	34.4%	19.2%	10.3%	5.4%
1979	22.3	35.0	22.4	13.2	7.1
1989	15.9	35.2	24.4	15.7	8.8
2000	12.6	32.1	27.7	18.5	9.1
2007	12.0	31.1	27.3	19.9	9.8
2011	10.2	30.2	28.3	20.8	10.6

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

Table 4.16 Hourly wages of women, by education, 1973–2011 (2011 dollars)

	Less than high school	High school	Some college	College degree	Advanced degree
Real hourly wage					
1973	$10.53	$13.03	$14.08	$19.50	$25.82
1979	11.00	13.04	14.00	17.73	22.71
1989	9.98	12.91	14.96	20.24	26.38
1995	9.63	13.04	14.92	21.72	28.56
2000	10.06	13.77	15.97	24.04	30.37
2007	10.52	14.08	16.34	24.59	31.34
2011	10.32	13.83	15.82	24.31	31.76
Annual percent change					
1973–1979	0.7%	0.0%	-0.1%	-1.6%	-2.1%
1979–1989	-1.0	-0.1	0.7	1.3	1.5
1989–2000	0.1	0.6	0.6	1.6	1.3
1989–1995	-0.6	0.2	0.0	1.2	1.3
1995–2000	0.9	1.1	1.4	2.1	1.2
2000–2007	0.6	0.3	0.3	0.3	0.5
2007–2011	-0.5	-0.5	-0.8	-0.3	0.3
Share of employment					
1973	25.6%	44.0%	17.5%	9.9%	3.1%
1979	17.2	43.0	23.4	12.0	4.4
1989	11.2	38.8	27.8	15.4	6.8
2000	8.8	31.6	32.0	19.1	8.4
2007	7.4	28.0	32.2	22.0	10.4
2011	6.5	25.7	32.6	23.1	12.1

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

growth in the late 1990s stands apart from the long-term trend over the 16 years from 1979 to 1995, when wages fell sharply among non-college-educated men. The decline was sizable even among men with "some college"—8.9 percent from 1979 to 1995. The wage of the average high school–educated male fell more, 15.0 percent, from 1979 to 1995, while the wages of those without a high school degree fell 26.4 percent. By contrast, the wages of male college graduates rose, but more modestly than commonly thought—just 3.7 percent from 1979 to 1995. Year-by-year data show that male college wages in the 1979–1995 period peaked in 1988 (and fell thereafter).

Over the 1979–2011 period the pattern of growing wages for college-educated males (almost entirely due to the 1995–2000 period) and declining or stagnant wages for non-college-educated males meant a rise in the relative wage, or wage premium, for male college graduates. As shown in Table 4.13, the estimated college/high school wage premium (controlling for experience, race, and other characteristics) grew from 20.2 percent in 1979 to 34.0 percent in 1989 and to 44.8 percent by 2011. As previously mentioned, however, there was a flattening of the male college/high school wage premium from 1988 to 1996, particularly in the early 1990s (as shown in Figure 4N). Since there was not an acceleration of the supply of college-educated men, this slower growth in the premium implies, within a conventional demand-supply framework, that growth in the relative demand for college workers slowed in that period. From 1996 to 2000, however, this key education differential among men jumped again, followed by another period of flat college wage premiums for men and a bump up during the post-2007 recessionary years. Thus, the growth in the male college wage premium has been relatively modest since 1988, with the exception of the late 1990s.

As we have seen in our earlier examinations of the wage structure, women's wages have grown faster than men's in nearly every category (wage deciles, shrinkage of poverty-level wages, etc.). However, the same general pattern of relative wages—that is, who does better—prevails among women as among men (Table 4.16). From 2007 to 2011 wages fell for women with college degrees and those with less education, as happened for men, although the fall in wages was less among women. From 2000 to 2007, wages among women of all education groups rose modestly, with little variation among education groups. Wages rose 0.3 percent annually for those with a high school degree, some college, and a college degree, and a bit faster for those without a high school degree and those with an advanced degree. Year-by-year data (not shown in Table 4.16) show that wages during the 2000–2007 business cycle peaked in 2003 among women with college degrees or less education—a group comprising about 90 percent of women workers in 2007. Thus, there was pervasive wage stagnation or decline among women after 2003 in nearly every education group, parallel to the disappointing trends among men.

In the late 1990s wages grew much more strongly among women in every education group, with the familiar pattern of college graduates having the fastest growth (even greater than among those with advanced degrees). In the 1979–1989 and 1989–1995 periods, wages were stagnant among high school–educated women but fell significantly (12.4 percent) among those without a high school degree. Women with some college saw significant wage gains in the 1980s (unlike their male counterparts), but not in the early 1990s. College-educated women (those with college or advanced degrees) saw strong wage growth throughout the 1979–1995 period, faring by far the best among all gender-education categories. This pattern of wage growth resulted in growth of the college/high school wage

differential comparable to that of men from 1979 to 1989 (Table 4.13), from 25.0 percent in 1979 to 40.0 percent in 1989. It further increased to 46.7 percent in 1995 (with this 1989–1995 increase being higher than among men). However, the college wage premium among women has barely budged since 1995, rising only 2 percentage points to 48.7 percent in 2011. Thus, the education wage gap grew more among women than among men from 1979 to 1995 and then stagnated thereafter, while it continued to rise somewhat among men after 1995. From 1979 to 1995 the relative losers among women—the non-college-educated—saw relatively stagnant wages, whereas among men the wages of those same groups fell.

Even though the wages of college-educated women have grown rapidly since 1979, a female college graduate in 2011 earned $24.31 an hour—$7.50, or about 24 percent, less than a male college graduate that same year and roughly $3.00, or about 11 percent, less than a male college graduate earned in 1979, more than 30 years ago. Thus, the gender wage gap among college graduates has shrunk but remains sizable.

Table 4.17 shows a breakdown of employment in 2011 by the highest degree attained and by gender and nativity status. Some 33.2 percent of those employed

Table 4.17 Educational attainment of the employed, by gender and nativity, 2011

	Percent of employment			Native born	Foreign born
	Men	Women	All		
Highest degree attained					
Less than high school	10.2%	6.5%	8.4%	5.1%	25.9%
High school/GED	30.2	25.6	28.0	28.4	25.7
Some college	19.0	20.5	19.7	21.3	11.3
Associate degree	9.3	12.2	10.7	11.4	6.9
College degree	20.8	23.1	21.9	22.7	17.9
Advanced degree*	10.6	12.1	11.3	11.1	12.3
Total	100.0	100.0	100.0	100.0	100.0
Cumulative education level					
High school or less	40.4%	32.1%	36.4%	33.5%	51.6%
Less than a college degree	68.6	64.8	66.8	66.2	69.8
College degree or more	31.4	35.2	33.2	33.8	30.2
Advanced degree*	10.6	12.1	11.3	11.1	12.3

* Includes law degrees, Ph.D.s, M.B.A.s, and similar degrees

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

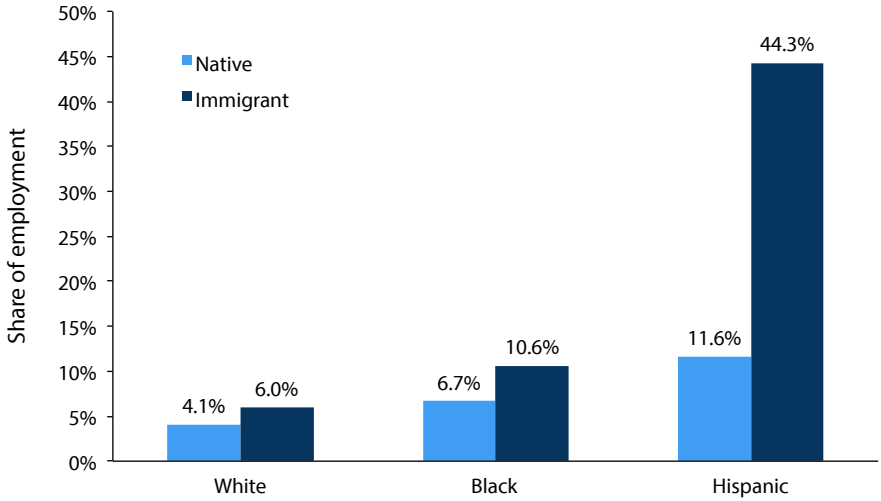
had at least a four-year college degree: 21.9 percent had a college degree only, and 11.3 percent also had a graduate or professional degree. Correspondingly, 66.8 percent of people employed had less than a college degree: 8.4 percent did not complete high school, 28.0 percent completed high school or obtained a GED, another 19.7 percent attended college but earned no degree beyond high school, and 10.7 percent held an associate degree. These data reinforce the earlier observation that the poor wage performance experienced by the "less educated" (frequently defined by economists as those without a college degree) between 1979 and 1995 and then in the 2002–2007 recovery affected a very large share of the workforce. This is important to note because the language used in public discussion frequently asserts that the "less educated" or "unskilled" have done poorly, leaving the impression that they are a small part of the population. But if "less educated" implicitly corresponds to those without a four-year college degree—who constitute about two-thirds of employed people—then it is rather misguided to consider this group as small. It was even more misguided during the 1980s, when this group comprised between about 75 percent and 80 percent of those employed.

Also worth noting is that workers with more than a high school degree but less than a four-year college degree now make up a group larger in size (30.4 percent of unemployment) than high school graduates (28.0 percent) and almost as large as those with at least a bachelor's degree (33.2 percent). Also noteworthy is that female workers have substantially more education than male workers; women have a larger share with associate degrees, college degrees, and advanced degrees.

The educational attainment of the workforce differs by immigration status. Native-born workers are more likely to have at least a college degree than foreign-born workers. Immigrants are more likely to have advanced degrees (12.3 percent versus 11.1 percent), but fewer have just college degrees (17.9 percent versus 22.7 percent). The starkest difference between foreign- and native-born workers is that immigrants are far more likely to lack a high school education (25.9 percent) than natives (5.1 percent). The data underlying Table 4.17 show that half of all workers who lack a high school credential are immigrants.

Figure 4O provides a further breakdown of the "less than high school" or "high school dropout" category by race and ethnicity. Only 4.1 percent of native-born whites and 6.7 percent of native-born blacks lack a high school degree, while 11.6 percent of native-born Hispanics do. Thus, there are very small proportions of native-born workers without a high school credential, and this is quite remarkable given that in 1973 (when the immigrant workforce was smaller) 28.5 percent of workers lacked a high school credential. Across racial and ethnic groups, a larger share of immigrants lacks a high school credential. Hispanic immigrants have by far the greatest concentration of workers without a high school credential, at 44.3 percent.

Figure 4O Share of the employed lacking a high school degree, by race/ethnicity and nativity status, 2011



Source: Authors' analysis of basic monthly Current Population Survey microdata

Young workers' wages

Young workers' prospects are an apt barometer of the strength of the labor market. When the labor market is strong for workers the prospects for young workers are very strong, and when the labor market is weak their prospects are very weak. This is because young workers tend to be more readily laid off in downturns and have the hardest time finding employment when jobs are scarce. In general, younger workers are "marginal workers." The recent decade affirms this general finding, as the wages of entry-level workers have fared extremely poorly during this period of general wage stagnation. This happened as well from 1973 to 1995, when the most dramatic erosion of wages was among young workers. Also consistent with this volatility of young workers' wages is that young workers experienced the fastest wage growth over the 1995–2000 period of booming wages.

Table 4.18 presents trends in wages of entry-level high school and college graduates by gender, where an entry-level worker is defined as one who has been in the workforce long enough to potentially have one to seven years of experience. It is interesting to note that in the recent period of disappointing wage growth, wages actually fell among every entry-level group, both high school and college graduates and both men and women. That is, real wages fell for entry-level men and women high school *and* college graduates in the years between 2000 and 2007, and there were steep wage declines for *each* group of entry-level workers

Table 4.18 Hourly wages of entry-level and experienced workers, by gender and education, 1973–2011 (2011 dollars)

	Real hourly wage							Change				
	1973	1979	1989	1995	2000	2007	2011	1979–1989	1989–2000	2000–2007	2007–2011	1979–2011
High school												
Men												
Entry*	$15.92	$15.64	$12.59	$11.67	$12.82	$12.70	$11.68	-19.5%	1.8%	-0.9%	-8.0%	-25.3%
Age 34–40	22.75	22.39	19.47	18.66	19.44	19.43	18.42	-13.0	-0.2	-0.1	-5.2	-17.7
Age 49–55	23.97	23.88	21.96	20.94	20.80	20.89	20.61	-8.0	-5.3	0.4	-1.3	-13.7
Women												
Entry*	$11.66	$11.56	$10.30	$9.96	$10.93	$10.23	$9.92	-10.8%	6.1%	-6.4%	-3.1%	-14.2%
Age 34–40	13.38	13.50	13.51	13.64	14.52	14.69	14.14	0.0	7.5	1.2	-3.7	4.7
Age 49–55	13.95	13.89	14.21	14.31	15.24	15.78	15.35	2.3	7.3	3.5	-2.7	10.5
College												
Men												
Entry**	$21.11	$20.61	$21.07	$19.51	$23.47	$22.88	$21.68	2.2%	11.4%	-2.5%	-5.2%	5.2%
Age 34–40	34.07	32.03	31.17	31.88	35.33	37.10	36.24	-2.7	13.4	5.0	-2.3	13.1
Age 49–55	35.11	35.50	35.05	35.20	36.41	36.39	36.40	-1.3	3.9	-0.1	0.0	2.5
Women												
Entry**	$17.69	$16.30	$18.34	$17.95	$20.00	$19.67	$18.80	12.5%	9.0%	-1.6%	-4.4%	15.4%
Age 34–40	21.11	18.68	21.18	23.86	25.99	27.15	27.39	13.4	22.7	4.4	0.9	46.6
Age 49–55	20.14	18.91	20.56	23.94	25.19	27.04	27.11	8.8	22.5	7.3	0.3	43.4

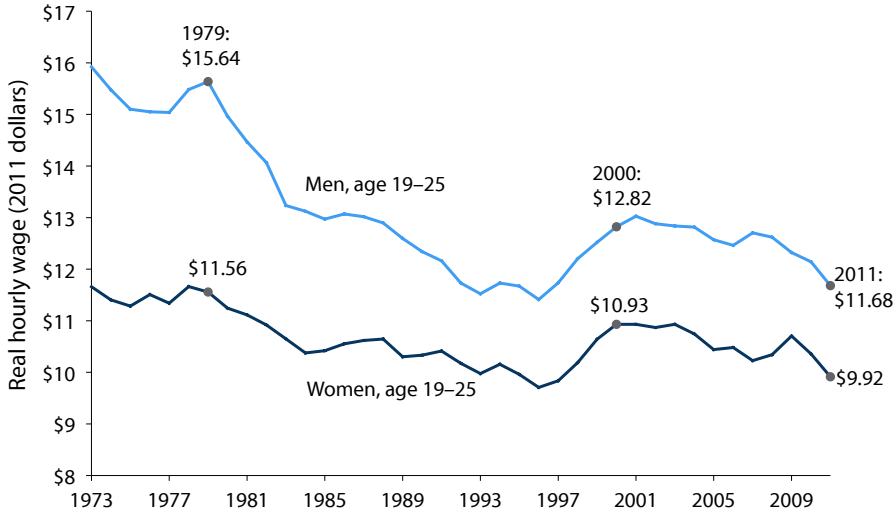
* Entry-level wage measured as wage of those from 19 to 25 years old
** Entry-level wage measured as wage of those from 23 to 29 years old

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

in the recessionary years between 2007 and 2011. As a result, growth since 2000 has been far worse than pre-2000. For example, between 2000 and 2011, hourly wages of entry-level high school graduates fell 8.9 percent for men and 9.3 percent for women; for college-educated men and women at the entry level, wages over that period fell 7.6 percent and 6.0 percent, respectively. This contrasts with the extremely strong wage growth for each of these groups from 1995 to 2000, when wages rose roughly 10 percent for entry-level high school men and women, 20.3 percent for entry-level college men, and 11.4 percent for entry-level college women. This change illustrates the vast swing in wages of entry-level workers between a period of strong wage growth and one with stagnant wages.

The longer-term trends in the hourly wages of entry-level high school graduates are shown in **Figure 4P**. The wage boom of the late 1990s carried over into the first few years of the 2000s for most workers, but it ended in 2001 for these entry-level workers, and wages have fallen since (except in 2009 for women and 2007 for men). Figure 4P also shows the dramatic deterioration of wages for entry-level high school men over the 1979 to 1996 period, an indicator of the loss of earning power among non-college-educated men and the consequent even larger loss for younger workers. Entry-level wages of female high school graduates have remained significantly below those of their male peers, and their wages also fell substantially from 1979 to 1996.

Figure 4P Real entry-level wages of high school graduates, by gender, 1973–2011



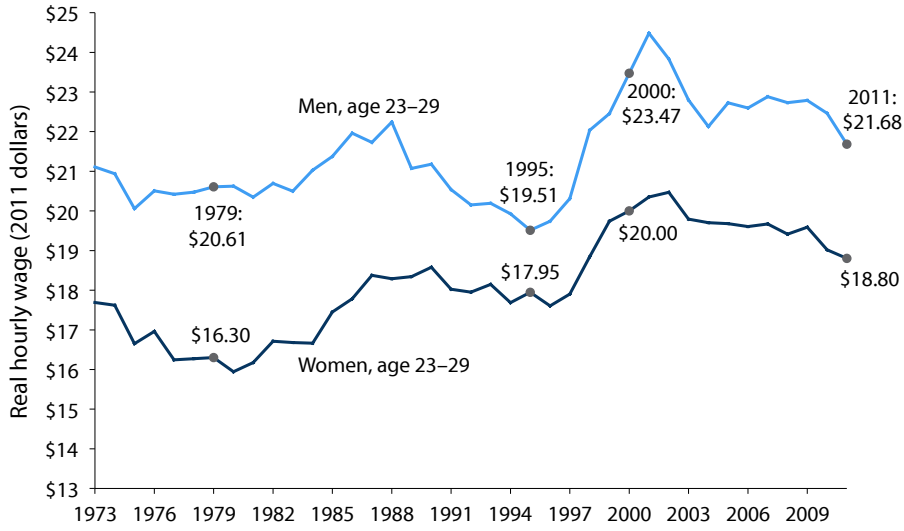
Note: Entry-level wages are for workers with one to seven years of potential experience.

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

As a result, despite the strong wage increases in the late 1990s, the entry-level wages of men and women high school graduates in 2011 were far below their levels of 1979 or 1973. For instance, the entry-level hourly wage of a young male high school graduate in 2011 was 25.3 percent less than the wage of the equivalent worker in 1979, a drop of roughly $4.00 per hour (in 2011 dollars). Among women, the entry-level high school wage fell 14.2 percent in this period, a drop of $1.64. Note that wages in entry-level jobs held by high school–educated women are still roughly 15 percent less than those in jobs held by their male counterparts in 2011, though that gap has narrowed from about 26 percent in 1979.

Entry-level wages fell among both female and male college graduates from 2000 to 2007, 2.5 percent among men and 1.6 percent among women, and tumbled further in the recessionary years after 2007 (**Figure 4Q**). This means that young college graduates who finished their education in the last five years or so are earning significantly less than their older brothers and sisters who graduated in the late 1990s. The poor wage growth in this last decade contrasts markedly with the period of strongly rising wages for entry-level male college graduates from 1995 to 2000, when wages grew 20.3 percent. In the prior 16 years, from 1979 to 1995, the male entry-level college hourly wage fell more than a dollar. Thus, the period of falling wages since 2000 does not stand as the exception to the rule

Figure 4Q Real entry-level wages of college graduates, by gender, 1973–2011



Note: Entry-level wages are for workers with one to seven years of potential experience.

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

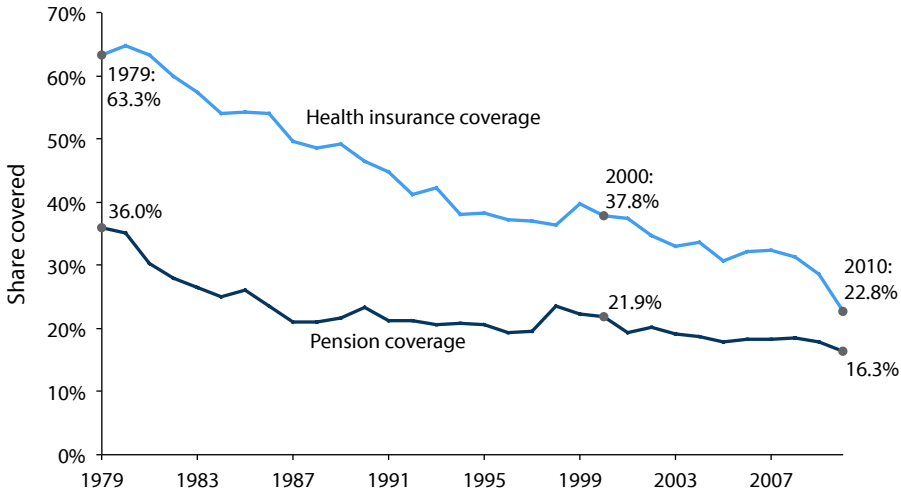
for young male college graduates; it is the wage boom of the late 1990s that seems exceptional. In 2011 the hourly wage of entry-level male college graduates was just a bit over $1.00 higher than in 1979, a rise of 5.2 percent over 32 years.

The wages of female college graduates (including those with advanced degrees) have grown more strongly than the wages among any other group of women, and this strength is reflected in the long-term trend among entry-level female college graduates; their wages grew 15.4 percent, or $2.50, from 1979 to 2011. In this light, the erosion of wages among entry-level female college graduates since 2000 stands out, with a fall of 1.6 percent from 2000 to 2007 and a 4.4 percent decline from 2007 to 2011. In the most recent decade, the most-educated workers (college graduates) with the newest skills (young college graduates) did not fare well at all, as their wages fell even as overall productivity in the economy continued to soar.

The wage trends for older workers, those 34–40 years old and 49–55 years old, were generally more positive than for the youngest workers among both education groups and for men as well as women (Table 4.18).

The erosion of job quality for young workers can also be seen in their lower likelihood of receiving employer-provided health insurance or pensions. In particular, we are focused on whether entry-level workers receive these benefits from

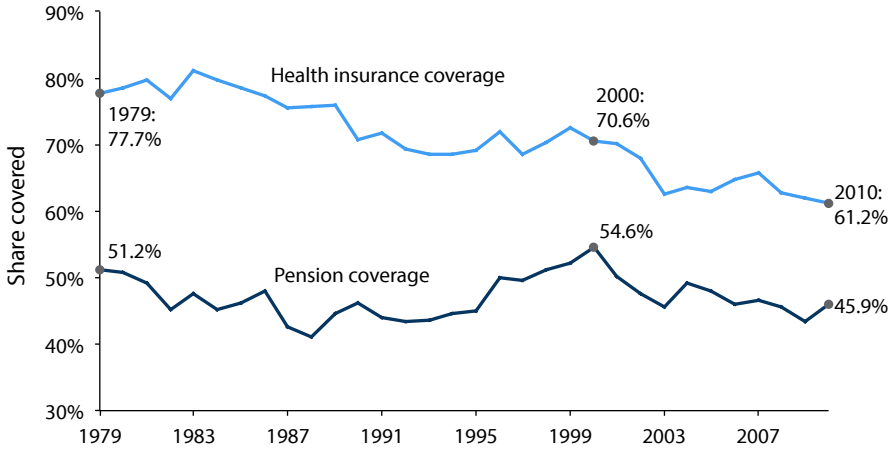
Figure 4R Share of recent high school graduates with employer health/ pension coverage, 1979–2010



Note: Sample is of private wage-and-salary earners age 19–25 who worked at least 20 hours per week and 26 weeks per year. Coverage is defined as being included in an employer-provided plan where the employer paid for at least some of the coverage.

Source: Authors' analysis of Current Population Survey Annual Social and Economic Supplement microdata

Figure 4S Share of recent college graduates with employer health/pension coverage, 1979–2010



Note: Sample is of private wage-and-salary earners age 23–29 who worked at least 20 hours per week and 26 weeks per year. Coverage is defined as being included in an employer-provided plan where the employer paid for at least some of the coverage.

Source: Authors' analysis of Current Population Survey Annual Social and Economic Supplement microdata

their *own* employers (not from their parents' employers). **Figures 4R** and **4S** show the rate of employer-provided health insurance and pension coverage in entry-level jobs for high school and college graduates, respectively. Employer-provided health insurance among recent high school graduates fell by roughly half, from 63.3 percent to 32.5 percent, between 1979 and 2007—even before the substantial erosion to just 22.8 percent in 2010 (the latest available data). Employer-provided health insurance coverage is perhaps the single best indicator to workers as to whether they have a good-quality job. This dramatic erosion of health coverage among young high school–educated workers, then, is a telling indicator of their loss of good jobs over the last few decades. Pension coverage fell over this period as well, from an already low 36.0 percent in 1979 to an even lower 16.3 percent in 2010.

Health insurance coverage also fell among recent college graduates, but not as drastically as among recent high school graduates. The share covered was 77.7 percent in 1979, 70.6 percent in 2000, and 61.2 percent in 2010. The fall since 2000 therefore exceeded the fall over the entire 1979 to 2000 period. The fact that employer-provided coverage is much higher among entry-level college graduates than entry-level high school graduates tells us that there remain significant economic benefits for completing college. But the fact that employer-provided

health insurance coverage is increasingly less likely to be provided to entry-level college graduates tells us that job quality among college graduates is deteriorating. Pension coverage among young college graduates follows the overall pattern discussed in an earlier section. It fell between 1979 and the late 1980s and then regained its earlier level by 1998, presumably because of increased participation in defined-contribution plans. However, this group's pension coverage fell from 2000 to 2010 by 8.7 percentage points, from 54.6 percent to 45.9 percent. This sharp reduction in both health and pension benefits for young college graduates over the last decade indicates a substantial job quality problem even for those with high educational attainment.

The growth of within-group wage inequality

The data presented so far illustrate the various dimensions of wage inequality. The between-group inequality of workers by both education and experience (or age) can be characterized as a growth in differentials in education and experience, which are sometimes labeled as an increase in the "returns to education and experience" or as a shift in the rewards or price of skill. We now examine in greater depth the growth of *within-group* wage inequality, the inequality among workers with similar education and experience.

This growth in within-group wage inequality was shown earlier in Table 4.13. The analysis in **Table 4.19** illustrates the growth of this type of inequality by presenting wage trends of low-, middle-, and high-wage high school and college-educated workers, by gender, where low, middle, and high earners refer, respectively, to those with wages at the 10th, 50th (median), and 90th percentiles. The data show a growing wage gap among college graduates and high school graduates.

Because of rising within-group inequality, the wage growth of the median or "typical" worker within each group has been less than that of the average worker within each group. For instance, the median wage of the male high school graduate fell 19.7 percent from 1979 to 2011, compared with a 12.7 percent drop in the group's average wage (Table 4.15). Similarly, the wage growth of male college graduates in the 1979–2011 period was 16.5 percent at the average (Table 4.15) but only 9.0 percent at the median (Table 4.19).

Table 4.19 shows that, while the high (90th percentile) wage among female college graduates grew 53.7 percent from 1979 to 2011, the low (10th percentile) wage in this group rose just 11.5 percent, a 42.2 percentage-point disparity. Similarly, wage trends at the top of the college male wage ladder (26.0 percent growth) and the bottom (a 6.0 percent decline) diverged dramatically from 1979 to 2011. Wage disparities among high school graduates grew over the last few decades but not as much as among college graduates.

Table 4.19 Hourly wages by wage percentile, gender, and education, 1973–2011 (2011 dollars)

	Real hourly wage							Change				
	1973	1979	1989	1995	2000	2007	2011	1979–1989	1989–2000	2000–2007	2007–2011	1979–2011
High school												
Men												
Low	$10.57	$9.79	$8.42	$8.18	$8.93	$8.70	$8.33	-14.0%	6.1%	-2.6%	-4.3%	-14.9%
Median	19.06	18.67	16.34	15.07	15.88	15.84	15.00	-12.5	-2.8	-0.3	-5.3	-19.7
High	31.13	30.47	28.81	27.71	29.07	29.61	29.80	-5.4	0.9	1.8	0.7	-2.2
Women												
Low	$7.16	$8.17	$6.68	$6.97	$7.64	$7.61	$7.64	-18.2%	14.3%	-0.4%	0.4%	-6.4%
Median	11.83	11.56	11.56	11.39	12.17	12.19	12.01	0.0	5.4	0.1	-1.5	3.9
High	19.57	19.73	20.82	21.05	21.87	21.94	22.09	5.5	5.0	0.4	0.6	12.0
College												
Men												
Low	$13.05	$12.63	$11.93	$11.41	$13.04	$12.54	$11.87	-5.5%	9.3%	-3.8%	-5.4%	-6.0%
Median	24.50	23.81	24.74	24.41	26.97	26.98	25.96	3.9	9.0	0.0	-3.8	9.0
High	45.69	43.74	44.85	47.70	52.20	56.33	55.10	2.5	16.4	7.9	-2.2	26.0
Women												
Low	$10.04	$9.07	$9.41	$9.59	$10.65	$10.79	$10.12	3.7%	13.2%	1.3%	-6.3%	11.5%
Median	17.34	15.75	18.18	19.34	20.92	20.87	20.25	15.4	15.0	-0.2	-3.0	28.5
High	27.39	26.77	31.67	35.84	40.12	41.69	41.15	18.3	26.7	3.9	-1.3	53.7

Note: Low, median, and high earners refer, respectively, to those earning the 10th, 50th, and 90th percentile wage.

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

The question remains, however, as to how much the growth in overall wage inequality in particular time periods has been driven by changes in inequality among groups of workers with different education levels or other measures of skill (between-group wage inequality) versus changes in inequality among workers with comparable education or skill (within-group wage inequality). It would also be useful to know the role of the growth of between- and within-group inequality on growing wage inequality at the top (the 90/50 differential) versus the bottom (the 50/10 differential), but measurement techniques for answering this question are not readily available.

Table 4.20 presents the trends in overall wage inequality (as measured by the standard deviation of log hourly wages) and the trends in within-group and between-group wage inequality. These measures allow an examination of how much of the change in overall wage inequality in particular periods was due to changes in within-group wage inequality and between-group wage inequality (primarily changes in the differentials for education and experience).

The data in Table 4.20 indicate that almost 60 percent of the growth of wage inequality since 1979 (to either 2007 or 2011) was driven by the growth of within-group wage inequality. Among women, for instance, overall wage inequality, measured as a standard deviation (dispersion around the average) of log wages, grew 0.140 from 1979 to 2007, of which 0.082 was due to growth of within-group inequality. Similarly, 0.073, or 63.8 percent, of the 0.114 increase in overall male wage inequality from 1979 to 2007 was due to growing within-group inequality.

There were very different trends in particular subperiods. For this analysis Table 4.20 departs from the strictly business cycle periods examined in other tables (though they can be constructed from the data presented) and examines changes in inequality measures for the 1979–1995 period, the late 1990s period (1995–2000), and then the business cycle from 2000 to 2007 and the post-2007 trend. The growth of wage inequality in the earliest period, from 1979 to 1995, was driven by both within-group inequality and between-group inequality, with the within-group wage changes contributing about 55 to 56 percent of the growth of overall wage inequality. Most of the longer-term growth in wage inequality occurred in this early period. The late 1990s saw no change in wage inequality among men and a reduction in wage inequality among women. Wage inequality remained stable among men because growing within-group wage inequality was offset by falling between-group wage inequality. Among women it was falling within-group wage inequality that reduced overall wage inequality in the late 1990s.

The patterns of 1979–1995 returned in the 2000–2007 cycle, with wage inequality growing again, but this time it was primarily driven by within-group wage changes, which accounted for about 80 percent of the growth of wage inequality. This corresponds to our earlier finding that the college premium and other between-group differentials did not expand much in this period even though wage

Table 4.20 Contribution of within-group and between-group inequality to total wage inequality, 1973–2011

	Women				Men			
	Overall wage inequality*	Between-group inequality**	Within-group inequality***	Contribution of within-group inequality	Overall wage inequality*	Between-group inequality**	Within-group inequality***	Contribution of within-group inequality
	(1)	(2)	(3)	(3)/(1)	(1)	(2)	(3)	(3)/(1)
1973	0.478	0.061	0.418	87.3%	0.506	0.083	0.423	83.6%
1979	0.446	0.044	0.402	90.1	0.506	0.078	0.428	84.7
1989	0.529	0.082	0.447	84.5	0.579	0.112	0.467	80.7
1995	0.562	0.095	0.467	83.1	0.595	0.118	0.478	80.2
2000	0.552	0.094	0.458	82.9	0.595	0.114	0.481	80.8
2007	0.586	0.102	0.484	82.7	0.620	0.119	0.501	80.8
2011	0.593	0.108	0.485	81.8	0.635	0.128	0.507	79.9
Change, subperiods								
1979–1995	0.116	0.051	0.065	56.1%	0.089	0.040	0.049	55.2%
1995–2000	-0.009	-0.001	-0.009	91.8	0.000	-0.003	0.003	****
2000–2007	0.033	0.007	0.026	78.0	0.025	0.005	0.020	80.9
2007–2011	0.008	0.006	0.001	14.8	0.014	0.009	0.005	37.7
Change, longer-term								
1979–2007	0.140	0.057	0.082	58.9	0.114	0.041	0.073	63.8
1979–2011	0.147	0.064	0.084	56.7	0.129	0.050	0.078	60.9

* Measured as standard deviation of log wages

** Reflects changes in education, experience, race/ethnicity, marital status, and regional differentials

*** Measured as mean square error from a standard (log) wage regression

**** Not applicable because denominator is zero

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

inequality, mostly in the top half, grew strongly. The recessionary period after 2007 saw wage inequality continue to grow, but the character shifted again, relying more on the between-group changes. This is also what we saw in Table 4.13 as experience differentials and some education differentials expanded. These trends may reflect the more difficult experience of younger workers and those with less education in this very deep downturn; therefore, these trends may not persist as unemployment falls over the next few years—an interesting trend to watch.

Table 4.20 makes clear that any explanation of growing wage inequality must go beyond explaining changes in skill, education, experience, or other wage differentials and be able to explain growing inequalities within each of these categories, since they account for more than half of all the growth in overall wage inequality.

Wage inequality by race/ethnicity and gender

Race and ethnicity have long played an important role in shaping employment opportunities and labor market outcomes, and **Table 4.21** examines changes in those dimensions of the wage structure. Wage trends are presented by gender for two indicators of the middle of the wage structure (the median hourly wage and the average hourly wage of high school–educated workers) for four populations: white, black, Hispanic, and Asian. (A finer breakdown of groups—for example, subpopulations of Hispanics—is not possible because of sample size limitations; for the same reason, trends for the 1980s are unavailable. Also, note that our definitions of race/ethnicity categories exclude Hispanics from the white, black, and Asian groups.)

From 2000 to 2007 growth in the male median wage was relatively modest or stagnant for whites, Hispanics, and blacks. The 10.7 percent rise among Asian men is an exception, though most of that growth occurred by 2003. The wage trends among male high school graduates tell a similar story of largely stagnant wages for each racial/ethnic group from 2000 to 2007, including Asians (the Asian male high school wage is far below the median Asian wage so, unlike other racial/ethnic groups, it reflects a different part of the wage structure than the median). Wages deteriorated among middle-earning men over the 2007 to 2011 period regardless of race or ethnicity and regardless of measure—median or high school wages. Over the 1989–2000 period, the male high school wage fared poorly among each racial/ethnic group, except Asians, despite strong wage growth in the late 1990s. There have been large wage gaps between black and white men, and Hispanic and white men, since 1989. For example, examining wages averaged over the 2009–2011 period, the wage gap between black and white men, measured here as the ratio of black to white hourly wages, was about 79 percent among high school graduates and 72 percent among median-wage workers. Measured over the same period, the wage gap between Hispanic and white men, measured as the ratio of Hispanic to white hourly wages, was about 83 percent

Table 4.21 Hourly wage growth by gender and race/ethnicity, 1989–2011 (2011 dollars)

	Real hourly wage					Change				
	1989	1995	2000	2007	2011	1989–2000	1989–1995	1995–2000	2000–2007	2007–2011
Men										
Median wage										
White	$19.01	$18.29	$19.84	$20.33	$19.76	4.4%	-3.8%	8.5%	2.4%	-2.8%
Black	13.76	13.37	14.56	14.61	14.26	5.8	-2.8	8.9	0.3	-2.4
Hispanic	12.79	11.65	12.84	13.23	12.74	0.4	-8.9	10.2	3.0	-3.7
Asian	17.77	17.57	19.80	21.92	21.41	11.4	-1.1	12.7	10.7	-2.3
High school wage*										
White	$18.67	$17.86	$19.08	$19.16	$18.80	2.2%	-4.3%	6.8%	0.4%	-1.8%
Black	14.91	14.29	15.32	14.93	14.61	2.7	-4.2	7.2	-2.5	-2.1
Hispanic	15.47	14.68	15.48	15.97	15.31	0.1	-5.1	5.5	3.1	-4.1
Asian	16.33	15.93	16.99	17.20	16.22	4.1	-2.4	6.6	1.2	-5.7
Women										
Median wage										
White	$13.31	$13.63	$14.88	$15.95	$15.89	11.8%	2.4%	9.2%	7.2%	-0.4%
Black	11.86	11.73	13.04	13.27	13.13	9.9	-1.1	11.2	1.8	-1.1
Hispanic	10.58	10.37	11.04	11.65	11.77	4.3	-2.0	6.5	5.5	1.0
Asian	13.78	14.02	15.91	16.55	16.42	15.4	1.8	13.4	4.0	-0.8
High school wage*										
White	$13.11	$13.31	$14.09	$14.57	$14.42	7.5%	1.6%	5.8%	3.4%	-1.0%
Black	12.09	11.99	12.94	13.24	12.69	7.0	-0.9	8.0	2.3	-4.2
Hispanic	12.17	12.26	12.74	12.98	12.79	4.7	0.8	3.9	1.9	-1.5
Asian	12.48	12.62	13.57	13.22	13.02	8.8	1.1	7.6	-2.6	-1.5

* Average wage of high school–educated workers

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

among high school graduates and 65 percent among median-wage workers. These wage gaps among men have neither expanded nor shrunk appreciably since 1989, indicating that the growth of male wage inequality has not been grounded in expanded racial/ethnic wage gaps.

Wage growth among women has generally been stronger than among men in recent decades, as discussed previously. However, wage growth for men exceeded that for women from 2000 to 2007 among Asians, and among Hispanics men did

better by one measure (high school wages) but not by the other measure (median wages). In the recessionary years after 2007, wages fell for both men and women, but the fall was greater among men in nearly every race and ethnic group. Post-2007, Hispanic men seem to have suffered the largest wage declines among men, and black women had the greatest wage declines among women. From 1989 to 2000, Asians had the largest wage gains among men and women. Hispanics, on the other hand, saw the least wage growth among both men and women.

As with men, there have been large wage gaps between women of different races and ethnicities. Examining wages averaged over the 2009–2011 period, wages of black female high school graduates were about 89 percent of those of their white counterparts, while black median-wage workers earned about 84 percent as much as comparable white women. Ratios of Hispanic to white women's wages in 2009–2011 were 89 percent among high school graduates and 74 percent among median-wage workers. There has been some growth in these wage gaps among women, ranging from 3 to 6 percentage points. Thus, some of the increased wage inequality among women corresponds to greater racial/ethnic inequalities.

A common theme has been that women's wages have generally fared better than men's over the last few decades. **Table 4.22** presents the median wages of men and women and the ratio of women's to men's hourly wage as a way to describe the trend in the gender differential over time. In 1973 the ratio of the female median wage to the male median wage was 63.1 percent and, except for the 1970s, this ratio has increased in every time period; it stood at 84.0 percent in 2011. Thus, the wage gap between the genders was roughly halved over this time period. The rapid closing of the gender gap occurred primarily between 1979 and 1995, mostly as the result of a steady fall in the male median wage during the 1980s and the early 1990s but also because of a steady modest growth of the female median wage.

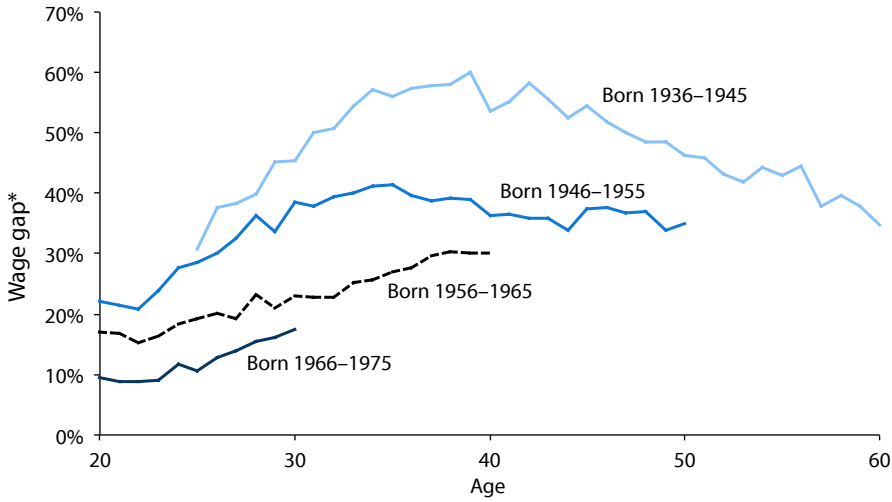
Another important dimension to examine is how the gender wage gap has changed for the various cohorts of workers over the postwar period and by age

Table 4.22 Gender wage gap, 1973–2011 (2011 dollars)

	1973	1979	1989	1995	2000	2007	2011
Real median hourly wage							
Women	$11.83	$11.99	$12.92	$13.07	$14.20	$14.91	$14.89
Men	18.74	19.13	17.68	17.03	18.21	18.29	17.72
Ratio women/men	63.1%	62.7%	73.1%	76.7%	78.0%	81.5%	84.0%

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

Figure 4T Gender wage gap, by age cohort



* Percent by which women's hourly wage is less than men's hourly wage

Source: Authors' analysis of Moore and Shierholz (2007)

within each cohort. **Figure 4T** shows the gender wage gap via the female *disadvantage* in wages at particular ages for several birth cohorts (such as those born between 1946 and 1955 or between 1956 and 1965). It is clear that in each cohort the wage gap rises from when workers enter the workforce in their 20s to the late 30s or age 40. For instance, for those born between 1956 and 1965 the gender wage gap was about 21 percent when they were in their late 20s but rose to 29 percent by their late 30s. Perhaps most important, the wage gap has lessened over time, as the gap is less for each succeeding cohort (since each successive cohort's line is lower than that of the preceding cohort). For example, women born between 1936 and 1945 were paid 58 percent less per hour worked than men when they were in their late 30s; for women born 20 years later, the gender wage gap was just half that large, 29 percent.

Research shows that shifts in skills, educational attainment, the gender composition of work, reductions in discrimination, changing social norms, and other factors have contributed to the closing of the gender gap.

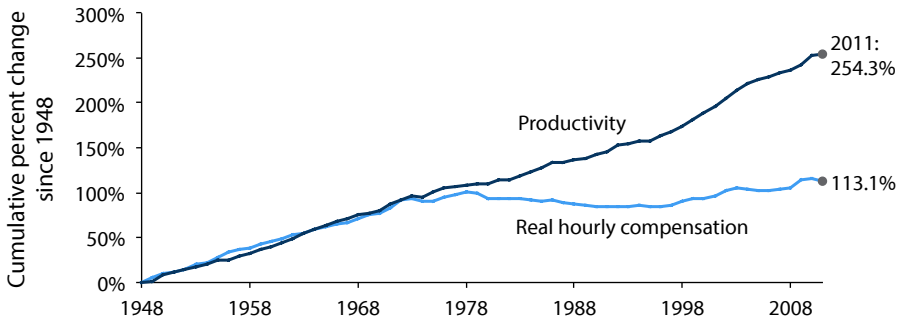
Productivity and the compensation/productivity gap

Productivity growth, which is the growth of the output of goods and services per hour worked, provides the basis for the growth of living standards. However, the experience of the vast majority of workers in recent decades has been that

productivity growth actually provides only the *potential* for rising living standards. Recent history, especially since 2000, has shown that wages and compensation of the typical worker and income growth of the typical family have lagged tremendously behind the nation's fast productivity growth. In contrast, the hourly compensation of a typical worker grew in tandem with productivity over the 1948 to 1973 period. This section examines the divergence between productivity growth and real hourly compensation growth for the typical (median) worker, focusing on the three "wedges," or factors, behind the divergence. These wedges explain the gap between the more than 80 percent growth in productivity from 1973 to 2011 and the correspondingly weak growth of real hourly compensation of the median worker, just 10.7 percent.

Figure 4U presents both the cumulative growth in productivity per hour worked of the total economy (inclusive of the private, government, and nonprofits sectors) since 1948 and the cumulative growth in inflation-adjusted average hourly compensation of private-sector production/nonsupervisory workers (who make up over 80 percent of payroll employment; their wages and compensation were presented in Table 4.3 and Figure 4B). Productivity and the typical worker's hourly compensation grew together from 1948 until 1973. After 1973, however, productivity grew strongly, especially after 1995, while the typical worker's compensation was relatively stagnant. This divergence of pay and productivity has

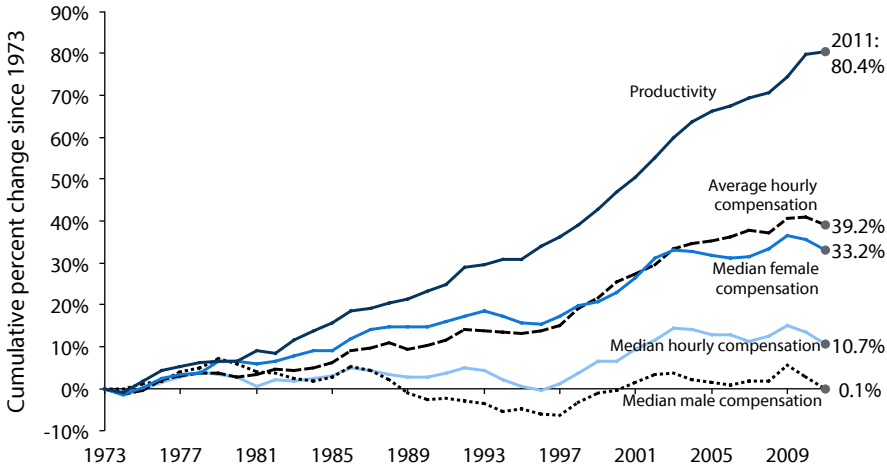
Figure 4U Cumulative change in total economy productivity and real hourly compensation of production/nonsupervisory workers, 1948–2011



Note: Data are for compensation of production/nonsupervisory workers in the private sector and productivity of the total economy.

Source: Authors' analysis of unpublished Total Economy Productivity data from Bureau of Labor Statistics Labor Productivity and Costs program, wage data from BLS Current Employment Statistics program, and Bureau of Economic Analysis National Income and Product Accounts

Figure 4V Cumulative change in hourly productivity, real average hourly compensation, and median compensation, 1973–2011



Note: Data are for compensation of production/nonsupervisory workers in the private sector and productivity of the total economy.

Source: Authors' analysis of unpublished Total Economy Productivity data from the Bureau of Labor Statistics Labor Productivity and Costs program, data from the Bureau of Economic Analysis National Income and Product Accounts, and Current Population Survey Outgoing Rotation Group microdata

meant that many workers were not benefiting from productivity growth—the economy could afford higher pay but was not providing it.

Figure 4V provides more detail on the productivity/pay disparity from 1973 to 2011 by charting the cumulative growth since 1973 in productivity, average hourly compensation, and median hourly compensation of all workers, men, and women. As Figure 4V illustrates, productivity grew 80.4 percent from 1973 to 2011, enough to generate large advances in living standards and wages if productivity gains were broadly shared. But average compensation—which includes the pay of CEOs and day laborers alike—lagged productivity growth, 39.2 percent versus 80.4 percent. This "wedge" between worker compensation and overall productivity growth—that of average worker pay not keeping up with productivity—partly reflects the *shift from wage income (labor income) to capital income* described in Chapter 2.

Hourly compensation of the median worker grew even less, just 10.7 percent. Most of the growth in median hourly compensation occurred in the late 1990s period of strong recovery; excluding the 1995 to 2000 period, median hourly compensation grew just 4.9 percent between 1973 and 2011. (As Figure 4A showed at the start of this chapter, productivity and median hourly compensation

growth diverged markedly between 2000 and 2011.) This second "wedge," of the median worker (whether male or female) not enjoying growth in compensation as fast as that of higher-wage workers, especially the very highest paid, reflects growing *wage and benefit inequality*.

A third "wedge" not visible in Figure 4V but examined later has to do with the different measures of prices used to compute productivity growth versus compensation growth. The output measure used to compute productivity is converted to real, or constant (inflation-adjusted), dollars based on the components of national output (GDP). Average hourly compensation and the measures of median hourly compensation are converted to real, or constant, dollars based on measures of price change in what consumers purchase. 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 in real (inflation-adjusted) output (which is adjusted for changes in the prices of investment goods, exports, and consumer purchases) than in real wages (which is adjusted for changes in consumer purchases only). That is, workers have suffered worsening "terms of trade," in which the prices of things they buy (i.e., consumer goods and services) have risen faster than prices of the items they produce (consumer goods but also capital goods). Thus, if workers consumed microprocessors and machine tools as well as groceries, their real wage growth would have been better and in line with productivity growth. In any case, it is important to examine this *terms-of-trade wedge between productivity and compensation growth*.

Table 4.23 depicts the basic trends in compensation and productivity and provides a breakdown (decomposition) that identifies the contribution of each factor to the productivity/median compensation gap in particular subperiods and overall from 1973 to 2011. The particular subperiods usually chosen in our analyses are business cycle peaks—years of low unemployment—with some exceptions. However, for this discussion the two business cycles, 1979–1989 and 1989–2000, are divided into the periods 1979–1995 and 1995–2000 to separate the period of low productivity growth from the period starting in 1995 when productivity growth accelerated.

Panel A shows the annual growth rates of median hourly wages and compensation, average hourly compensation, and hourly productivity. All measures are for the total economy, covering all sectors of the economy. The annual growth of the productivity/median hourly compensation gap is also presented for each period. That gap grew 1.3 percent a year from 1973 to 2011; it grew most quickly from 2000 to 2011 and from 1979 to 1995. Table 4.23 also shows that productivity accelerated in the late 1990s, growing 2.33 percent each year, far above the productivity growth of 1973–1995. Productivity growth since 2000 has remained much higher than during the "stagnation" of 1973–1995 but less than the productivity growth of the late 1990s.

Table 4.23 Factors contributing to the productivity/compensation gap, 1973–2011

	1973–1979	1979–1995	1995–2000	2000–2011	1973–2011
A. Basic trends *(annual change)*					
Median hourly wage	-0.26%	-0.15%	1.50%	0.05%	0.10%
Median hourly compensation	0.56	-0.17	1.13	0.35	0.27
Average hourly compensation	0.59	0.55	2.10	0.95	0.87
Productivity	1.08	1.29	2.33	1.88	1.56
Productivity/median compensation gap	0.52	1.46	1.21	1.53	1.30
B. Explanatory factors *(percentage-point contribution to gap)*					
Inequality of compensation	0.02	0.72	0.97	0.59	0.61
Shift in labor's share of income	0.03	0.23	-0.40	0.69	0.25
Divergence of consumer and output prices	0.46	0.51	0.64	0.24	0.44
Total	0.52	1.46	1.22	1.52	1.29
C. Explanatory factors *(percent contribution to gap)*					
Inequality of compensation	4.8%	49.6%	80.0%	38.9%	46.9%
Shift in labor's share of income	5.5	15.4	-32.5	45.3	19.0
Divergence of consumer and output prices	89.7	35.0	52.5	15.8	34.0
Total	100.0	100.0	100.0	100.0	100.0

Note: Rows in panels A and B show log annual change.

Source: Authors' analysis of Mishel and Gee (2012, Table 1)

Panels B and C show the percentage-point and percent contribution, respectively, of the explanatory factors behind the divergence of productivity and median hourly compensation. The first is the growing inequality of compensation, which is represented in this analysis by the changing ratio of average hourly to median hourly compensation. The second is the shift in labor's share of income, which is captured by changes in the nominal share of compensation in national output (GDP). The third factor is the divergence of consumer and output prices, the terms-of-trade wedge based on the change in consumer prices (with health benefits deflated by a medical index and the remaining portions of compensation deflated by consumer prices) relative to prices of national output.

The large productivity/median compensation gap from 2000 to 2011 was driven primarily by growing compensation inequality and the decline in labor's share of income; these two factors account for 38.9 percent and 45.3 percent, respectively, of the total gap. Terms of trade, or price divergences, were smaller in this period than in any other and accounted for only a small part, 15.8 percent, of the growing gap between productivity and median compensation.

Median hourly compensation accelerated in the late 1990s but not as much as productivity did, a divergence that generated a 1.21 percent gap on average each year from 1995 to 2000. This gap occurred despite labor's share of income *increasing*. In contrast, the earliest period, 1973–1979, saw no appreciable growth in compensation inequality or change in labor's share; the productivity/median compensation divergence primarily reflected price differences.

From 1973 to 2011 roughly half (46.9 percent) of the growth of the productivity/median compensation gap was due to increased compensation inequality, and about a fifth (19.0 percent) was due to a loss in labor's income share. About a third of the gap was driven by price differences.

Explaining the growing inequality of wages and compensation is the task of the rest of this chapter. It will follow a brief discussion of shifts in labor's share of income and the terms-of-trade effect.

The decline in the share of income accruing to workers has reduced workers' wage growth—meaning wages have grown less than they would have otherwise, as was examined directly in Chapter 2. There, we saw that the share of capital income in the corporate sector has grown significantly, driven by a comparably large increase in profitability, or the return to capital per dollar of plant and equipment. For instance, the share of income in the corporate sector going to capital income in the 2000s, especially in the recessionary years after 2007, was the highest in nearly 70 years. The share going to compensation was correspondingly at a low point. As explained in Chapter 2, the historically high returns to capital in 2007 relative to 1979 were equivalent to 3.4 percent, or $269 billion, of corporate-sector income. Had this amount of income not transferred from compensation to capital income, workers could have had a $3,400, or 4.3 percent, compensation increase. The transfer from compensation to capital income was even larger in 2010, as the capital income share of corporate income grew even larger. As a cause of the loss of wages for the typical worker, the income redistribution from labor to capital has been large when compared with factors such as the shift to services, globalization, the drop in union representation, or any of the other prominent explanations for growing wage inequality discussed in this chapter.

As for the terms-of-trade factor, there are two ways that the divergence in prices can be viewed. One way is to dismiss the divergence as a technical difference and to treat the associated productivity/pay gap as unimportant and uninteresting. The second way is to note that the widely articulated assumption that gains in labor productivity translate into improvements in living standards

implies that these two price series—consumption and output—must converge in the long run. Given that this convergence has not occurred for several decades, the second view suggests that productivity is not translating fully into improved living standards, and that the divergence between consumption prices and output prices represents another mechanism by which workers are not benefiting from economic growth. Rather than being dismissed or set aside, the terms-of-trade disadvantage workers have faced—and its one-third share of the growth of the productivity/median compensation gap—deserves serious inquiry and a full explanation. Unfortunately, little research has been done in this area. In any case, the implication is that the "typical" worker is not benefiting fully from productivity growth.

The bottom line is that from 1973 to 2011 the 10.7 percent growth of real hourly compensation of the median worker greatly lagged the 80.4 percent productivity growth in the economy, a gap of 69.7 percentage points. Roughly two-thirds (65.9 percent) of that gap can be explained by rising inequality of compensation (meaning higher-wage workers garnered a hugely disproportionate share of the compensation gains) and a declining share of income accruing to labor compensation (and a corresponding increase accruing to capital income, or returns to wealth). Had this rise in compensation inequality and fall in labor's income share not occurred, the real hourly compensation of the median worker would have risen by 56.7 percent, 46 percentage points higher (65.9 percent of the 69.7 percentage-point gap between productivity and median compensation growth) than the actual 10.7 percent growth. That is a sizable loss for middle-wage and other workers. In short, over the last four decades the economy had the demonstrated potential to raise middle-wage workers' living standards far more than it actually did, and a redistribution of compensation to highly paid wage workers and a redistribution of income from workers to wealth holders prevented that from happening.

Factors driving wage inequality

Having described wage trends and the various dimensions of wage inequality, we turn to examining drivers of wage inequality. Rather than considering growing wage inequality as a whole, our approach is to examine the factors behind the growth of the three key wage gaps—those between the very top and top, the top and middle, and the middle and the bottom. These gaps have grown at different paces and in different periods and are not necessarily driven by the same factors. Therefore, the discussion of each factor driving wage inequality focuses on the magnitude of the impact, the timing of the impact, and the gap(s) affected. In some cases the discussion focuses on the impact of a factor on key education or occupation wage gaps, such as those between college-educated and high school–educated workers, or between white- and blue-collar workers. These other

wage gaps have been frequently used in the literature and generally reflect the wage gap between the top and the middle.

Unemployment

Macroeconomic conditions greatly affect wage growth and wage inequality and are too often overlooked in explanations of rising wage and income inequality. Macroeconomic conditions reflect the overall health of the economy and determine whether it is producing below its capacity, as indicated by high unemployment and excess production capacity. Generally, slack in the economy is driven by monetary policy (e.g., the growth of the money supply and interest rates), fiscal policy (e.g., the size of the government surplus or deficit, with increasing deficits adding to demand and thereby lessening slack), and the U.S. international position (i.e., trade deficits and the flow of investment dollars abroad or from abroad to the United States). The recession that started in 2007 was the result of the burst of the housing bubble and the financial crisis that ensued (which suggests that financial regulation should also be listed as an additional macroeconomic policy). Macroeconomic factors that affect wage growth include not only those that limit or generate slack—reflected in unemployment and underemployment—but also those that shape productive potential or productivity, such as public and private investment, technological change, workforce skills, and work organization (how factors of production are combined).

Productivity growth and unemployment play key roles in driving wage trends. Productivity growth provides the potential for real wage gains and helps explain trends in wage growth. Unemployment, on the other hand, affects both average wage growth and wage inequality. The divergence of productivity and compensation growth was discussed in the last section; this section focuses on other macroeconomic factors influencing wage inequality, particularly the extent of unemployment and underemployment (trends in these factors are explored in detail in Chapter 5).

The burdens of an underperforming economy and high unemployment are not equally shared; lower- and middle-income families and racial and ethnic minorities are more likely to experience unemployment, underemployment, and slower wage growth because of a weak economy. For many years, until the last two decades, white-collar workers and high-wage workers were less affected by unemployment and recessions. Unsurprisingly, therefore, high unemployment is a factor that widens wage and income inequality.

There are a number of mechanisms through which high unemployment affects wages and, especially, affects wages differently for different groups of workers. The wages of groups that have lower wages; less education, experience, or skill; and less power in the labor market are generally more adversely affected by high unemployment and underemployment. In other words, those already

disadvantaged in the labor market become even more disadvantaged in a recession or in a weak economy. Conversely, as unemployment falls in a recovery and stays low, the greatest benefit accrues to those with the least power in the labor market—non-college-educated, blue-collar, minority, young, and low-wage workers.

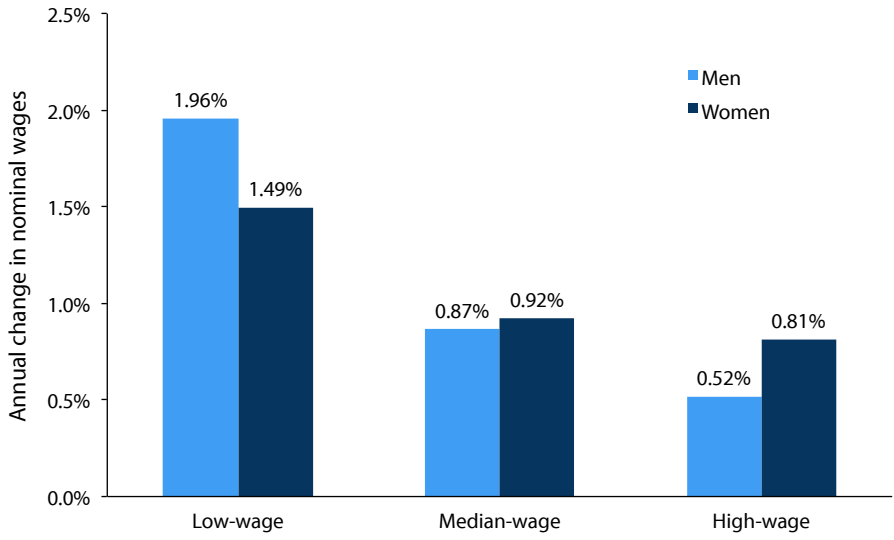
Why do these workers benefit disproportionately during a recovery? First, these groups experience the greatest employment decline in a downturn and the greatest employment growth in a recovery. This greater-than-average gain in employment reflects higher demand for these workers and consequently provides them with a greater increase in leverage with employers, a position that generates higher wages. Second, as unemployment drops, more opportunities for upward mobility arise for these workers, as they switch jobs either to a new employer or within the same firm. Third, unions are able to bargain higher wages when unemployment is low. Fourth, macroeconomic conditions and institutional and structural factors interact in important ways. For instance, the U.S. economy in the early 1980s experienced a surge of imports and a growing trade deficit, a decline in manufacturing, a weakening of unions, and a large erosion of the minimum wage that coincided with (and, as was the case with trade and manufacturing problems, partly caused) the rising unemployment at that time.

The impact of these trade and institutional factors on wage inequality was surely greater because they occurred at a time of high unemployment. For example, the impact of trade on wages (discussed in a later section) was greater because the recession had already induced a scarcity of good jobs. It should not be surprising that the most radical restructuring of wages (a tremendous growth in wage inequities) and the substantial real wage reductions for non-college-educated workers occurred during the period of very high unemployment from 1979 to 1985.

The persistently high unemployment of the last few years makes understanding the impact of unemployment on wage growth and on wage inequality critically important, especially because it appears that it will be many years before any "normal" rate of unemployment is attained.

The sensitivity (how much they would rise) of hourly wages of low-, middle-, and high-wage workers to a 1 percentage-point fall in unemployment, by gender, is presented in **Figure 4W**. This sensitivity is based on estimates of a well-known model that captures how much wages changed when the unemployment rate changed by 1 percentage point over 1979–2007. The relationship between unemployment and wage growth is assumed to be symmetrical, so these data also show the effect of a rise in unemployment if one simply changes the "sign" from positive to negative. As mentioned earlier, low-wage workers are more affected by changes in unemployment than are middle-wage workers, who, in turn, are more affected than are high-wage workers. The greater impact of unemployment

Figure 4W Increase in worker wages from a 1 percentage-point fall in unemployment, by wage group



Note: Low-, median-, and high-wage refer, respectively, to wages at the 10th, 50th, and 90th percentiles.

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

on low-wage men than on low-wage women may be due to women's wages being lower and more substantially protected by the minimum wage.

Table 4.24 illustrates the impact of rising and falling unemployment on wages and wage inequality over three periods: the high unemployment years of 1979–1985 and 2006–2011 and the years of persistent, decreasing unemployment from 1995 to 2000. Panel A shows the basic trends in unemployment and wage inequality of each period. Unemployment is measured for all workers and is illustrated in two ways: the change from the first to the last year of the period, and the cumulative amount of unemployment in the period that was either over or below the starting level, a measure designed to show the volume of unemployment over those years. For instance, in the six years from 1979 to 1985 the unemployment rate (measured annually) was a total of 13.9 percentage points over the starting rate of 5.8 percent. The volume of unemployment in the current downturn, 2006–2011, already exceeds that of the period encompassing the early 1980s downturn, even though the current downturn is shorter by one year. Unfortunately, there is more high unemployment ahead. To show wage inequality trends, Panel A also provides the changes in the wage gaps at the bottom (between

Table 4.24 Impact of rising and falling unemployment on wage levels and gaps, 1979–2011

	1979–1985 (High unemployment)		1995–2000 (Low unemployment)		2006–2011 (High unemployment)	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
A. Basic trends *(actual change)*						
Unemployment rate change	1.4	1.4	-1.6	-1.6	4.3	4.3
Cumulative higher/lower unemployment rate*	13.9	13.9	-5.0	-5.0	15.2	15.2
50/10 wage gap (log)	9.6	17.2	-4.1	-1.8	2.7	-0.4
90/50 wage gap (log)	8.7	8.0	3.0	1.0	3.1	2.7
B. Estimated cumulative impact of unemployment on:						
1) Hourly wages**						
Low wage	-25.2%	-18.4%	11.1%	8.2%	-29.4%	-21.5%
Median wage	-11.1	-11.6	4.9	5.2	-13.0	-13.6
High wage	-6.6	-10.2	2.9	4.6	-7.7	-11.9
2) Wage ratios (log)						
50/10	14.1	6.8	-6.2	-2.9	16.4	7.9
90/50	4.5	1.5	-2.0	-0.6	5.3	1.7
C. Unemployment contribution to change in:						
50/10 wage gap (log)	146%	39%	150%	168%	617%	-2123%
90/50 wage gap (log)	52	18	-66	-61	169	64

* How much the unemployment rate exceeded or fell below the starting level across the span of the period, measured in percentage points

** Wages at the 10th, 50th, and 90th percentiles of the wage distribution

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata and Current Population Survey public data series using model from Katz and Krueger (1999)

workers at the 50th and 10th percentiles of the wage distribution) and at the top (between the 90th and 50th percentiles).

Estimates of the cumulative impact of unemployment on wage levels of low-, middle-, and high-wage workers and on the two wage gaps are presented in Panel B. These estimates reflect how sensitive the particular wage levels are to both unemployment changes and the volume of unemployment. The data show substantial downward pressure on wages from high unemployment, particularly at the bottom end. This downward pressure can be offset by factors that prevent wages

from falling. One factor is "nominal wage rigidity," in which wage erosion primarily takes the form of reducing the growth of nominal (not inflation-adjusted) wages rather than reducing wages outright. A second factor is the minimum wage, which limits downward pressure from unemployment on wages at the bottom, especially among women (as noted earlier).

Higher unemployment, by putting more downward pressure on low than middle wages, and more pressure on middle than high wages, is a force for increasing the wage gap at the bottom (the 50/10 gap) and the top (the 90/50 gap), with the impact being greater at the bottom.

Panel C illustrates that the impact of unemployment on the wage gaps completely explains some of the observed changes in wage inequality during these particular periods. For instance, the 9.6 (log) percentage-point increase in men's 50/10 wage gap between 1979 and 1985 was less than the estimated unemployment impact of 14.1 percentage points, suggesting that without the volume of excess unemployment in that period we would not have observed any growth in the wage gap at the bottom for men, and in fact might have seen some narrowing. A substantial amount of the increased wage gap at the bottom among women in that same period, 6.8 percentage points of the 17.2 percentage-point change, was due to higher unemployment. Similarly, lower unemployment in the late 1990s pushed toward less wage inequality. The fact that wage inequality at the top continued to grow in the late 1990s is due to the presence of other factors driving up wage inequality there. Correspondingly, the wage gap at the bottom for both men and women fell in the late 1990s and would have fallen even further if not for other factors pushing inequality up while falling unemployment was pushing it down.

In the current downturn the large volume of high unemployment has exerted tremendous downward pressure on wages at the bottom (which, other factors aside, would have led to hourly wage decreases of 29.4 percent and 21.5 percent among men and women, respectively). Wages have not been able to fall as much as unemployment "demands" because of nominal wage rigidity and the minimum wage. The failure of wages to fall absolutely is very much a positive factor in maintaining wages and spending in the downturn and recovery. Note that the weight of unemployment on wages at the median or middle wage was about 13 percent for both men and women between 2006 and 2011, equivalent to more than 2 percent downward wage growth per year. This downward pressure on wages from high unemployment will continue to limit wage growth (and any concern about cost-inspired inflation) in the recovery for many years to come. And it is one reason that the lost decade of wage growth starting in 2002/2003 may be coupled with many more years of lost wage growth ahead.

The shift to low-paying industries

Another factor that contributes to growing inequality and lower pay, especially for non-college-educated workers, is a changing mix of industries in the economy. Such changes include the continued shift from goods-producing to service-producing industries and at times to lower-paying service industries. The shift in the industry mix of employment matters because some industries pay more than others for workers of comparable skill.

These industry employment shifts result from trade deficits and deindustrialization as well as from differential patterns of productivity growth across industries. (Industries facing the same growth in demand for their goods and services will generate more jobs the slower their productivity growth.) This section examines the significant erosion of wages and compensation of workers resulting from the employment shift to low-paying industries since the early 1980s.

Despite a common perception, the industry-shift effect is not the simple consequence of some natural evolution from an agricultural to a manufacturing to a service economy. For one thing, a significant part of the shrinkage of manufacturing is trade-related. More important, industry shifts would not provide downward pressure on wages if service-sector wages were more closely aligned with manufacturing wages, as is the case in other countries. Moreover, since health care coverage, vacations, and pensions in this country are related to the specific job or sector in which a worker is employed, the industry distribution of employment matters more in the United States than in other countries. An alternative institutional arrangement found in other advanced countries sets health, pension, vacation, and other benefits through legislation in a universal manner regardless

Table 4.25 Annual pay in expanding and contracting industries, 1979–2007

	Industries		Difference		Annual
Annual pay	Contracting	Expanding	Dollars	Percent	impact
Compensation *(2011 dollars)*					
2000–2007	$70,673	$60,048	-$10,625	-15.0%	-0.1%
1989–2000	57,809	45,130	-12,679	-21.9	-0.2
1979–1989	58,932	40,403	-18,528	-31.4	-0.3
Wages and salaries *(2011 dollars)*					
2000–2007	$58,449	$51,602	-$6,846	-11.7%	-0.1%
1989–2000	47,792	38,731	-9,061	-19.0	-0.1
1979–1989	48,077	36,999	-11,078	-23.0	-0.2

Source: Authors' analysis of Bureau of Economic Analysis National Income and Product Accounts and Bureau of Labor Statistics Current Employment Statistics

of sector or firm. Therefore, the downward pressure of industry shifts on wages and compensation can be said, in part, to be the consequence of the absence of institutional structures that lessen inter-industry pay differences.

The extent of the adverse effect of industry shifts on wages and compensation is examined in **Table 4.25**, which shows the annual wages and compensation of expanding and contracting industries in each business cycle since 1979. When industries with above (or below) average pay levels expand employment share, they raise (or lower) the average pay. The wages and compensation of "expanding" industries reflect the pay levels of each industry that experienced a rise in the share of total employment, weighted by the extent of the expansion in employment shares. These calculations show that expanding industries in 2000–2007 paid annual compensation of $60,048, or 15.0 percent less than contracting industries, which paid $70,673. The expansion of employment in lower-paid industries from 2000 to 2007 depressed compensation and wage growth by 0.1 percent each year. Thus, industry shifts in recent years have been *less* adverse than in the years 1979–1989, when the impact was to reduce compensation growth by 0.3 percent annually. This reduced impact is due to a lower pay gap between expanding and contracting industries in the 2000s than in the 1980s and to a diminished shift from one to the other in recent years. Nevertheless, this analysis shows that industry employment shifts have been consequential; they lowered average compensation by 5.3 percent between 1979 and 2007 (based on the annual impact times the number of years in each period).

Employer health care costs

Escalating health care costs and their effects on publicly provided health care programs and private insurance premiums remain a central concern of public policy, families, and employers. Controlling health care costs, for instance, was a key objective in the development of recent health care reform proposals. This section concerns the extent to which rising *employer* health care costs have squeezed wage growth and contributed to rising wage inequality. This discussion augments the analyses of the effect of health care and other benefits on household income and living standards growth (discussed in chapters 1 and 2) and on changes in real compensation and compensation inequality (examined earlier in this chapter).

Earlier in this chapter, we found that compensation inequality grew more than inequality of wages (Table 4.2) and that benefits grew faster than wages in some periods and not in others, such that the share of total compensation allocated to benefits had not grown since 1987. This indicates that the real value of benefits grew at the same rate as real wages over this period.

When we focus on growth in real compensation and real family incomes, and thus on living standards, we measure health care costs in inflation-adjusted terms to determine whether workers and families are enjoying greater health care services. This, in turn, means applying a specific medical services inflation

measure to health care costs, since medical services inflation is consistently greater than overall inflation. (A health-specific deflator is needed because the measure of the inflation affecting consumers/families—used to adjust wages—has a limited health care component that only includes out-of-pocket costs and not the broader costs of increased spending by employers.)

In contrast, the potential health care squeeze on wages examined in this section must be analyzed in nominal (non-inflation-adjusted) terms. The issue is whether rising employer costs for health insurance premiums leave less of planned compensation available for wage growth. For this purpose, we simply measure the rise in employer health care spending regardless of the inflation in medical services.

In the analysis that follows it is assumed that higher health spending by employers offsets the possibility of higher wages dollar-for-dollar. This is the conventional way of proceeding. In reality, this is unlikely to be the case for all types of workers at all times; the actual outcome will depend upon the bargaining power of workers relative to employers. But assuming a one-to-one tradeoff allows an estimation of the *maximum* potential squeeze of health care costs on wages.

Table 4.26 uses data from the National Income and Product Accounts to show employer costs for employee group health insurance as a share of wages

Table 4.26 Employer health care costs as a share of wages, 1948–2010

	Health cost share
1948	0.5%
1973	2.9
1979	4.5
1989	6.4
1995	7.3
2000	7.2
2010	8.9
Annual percentage-point change	
1948–1973	0.10
1973–1979	0.26
1979–2010	0.14
1979–1989	0.19
1989–2000	0.07
2000–2010	0.17

Source: Authors' analysis of Bureau of Economic Analysis National Income and Product Accounts

back to 1948. In that year employer health care costs were the equivalent of just 0.5 percent of total wages; by 2010 (the latest year for these data) they were 8.9 percent of wages. The table also presents the annual percentage-point growth of the health care share of wages to examine how quickly health care costs grew, relative to wages, in various subperiods. The fastest growth, 0.26 percentage points per year, occurred during the 1973–1979 business cycle, so in these years wage growth was 0.26 percentage points per year slower because of rising health care costs. Between 1979 and 2010 the growth was 0.14 percentage points annually, just a bit faster than the annual growth of 0.10 percentage points in the postwar period from 1948 to 1973; the difference amounts to less than one-tenth of one percentage point per year. This pattern suggests that rising health care costs were not an important factor in explaining why wages were stagnant over the 1980s through 2000s relative to the early postwar period.

A closer look at patterns of health care cost acceleration and deceleration over subperiods allows us to examine the contention that accelerating health care costs led to wage stagnation in the 2000s. Health care costs rose slowly (by 0.07 percentage points annually) between 1989 and 2000, after growing 0.19 percentage points annually in the 1980s. The deceleration of health care costs in the 1990s could explain a small (0.12 percentage-point annual) acceleration of wage growth in the 1990s relative to the 1980s. Similarly, the reemergence of health care cost growth relative to wages in the 2000s (to 0.17 percentage points annually, comparable to growth in the 1980s) can potentially explain a small (0.1 percentage-point annual) deceleration of wage growth in the 2000s. According to these data, therefore, rising health care costs in the 2000s, as in earlier periods, were not a major determinant of the pattern of wage growth.

It is possible, however, that health care cost increases have a larger impact on wages of particular groups of workers. In particular, some analysts have claimed that employer health care cost increases in the 2000s are responsible for the middle-class wage stagnation of recent years. **Table 4.27**, which draws on an analysis of the Medical Expenditure Panel Survey, examines this possibility by looking at health care costs as a share of wages by wage fifth.

Employer health care costs are generally largest, relative to wages, for those in the second and middle fifths, lower for those in the first and fourth fifths, and lowest for the highest-wage workers, and they are above average for the bottom four-fifths. (Note that these shares are computed for *all* workers in each fifth, including those who have no employer-provided health insurance.) The net impact of several factors generates this pattern. One factor is that coverage by employer-provided health benefits rises with wage level, which up to a point leads health costs as a share of wages to rise with wages. A second factor is that premiums are fixed per month; thus, an employer pays the same amount regardless of wages paid or hours worked that month. Since health care costs are spread over fewer hours of work for low-wage workers (who work fewer annual hours), fixed premiums

Table 4.27 Employer health care costs as a share of wages, by wage fifth, 1996–2008

	Wage fifth					
	Bottom	Second	Middle	Fourth	Top	Average
A. Health share of annual wages						
1996	8.2%	9.2%	8.0%	6.9%	4.4%	6.1%
2001	9.5	11.0	10.3	7.9	4.9	7.1
2008	9.3	12.8	11.9	9.7	6.2	8.5
B. Total change in share						
1996–2001	1.3	1.8	2.3	1.0	0.5	1.0
2001–2008	-0.2	1.8	1.6	1.8	1.3	1.4
C. Annual change in share						
1996–2001	0.3	0.4	0.5	0.2	0.1	0.2
2001–2008	0.0	0.3	0.2	0.3	0.2	0.2
1996–2008	0.1	0.3	0.3	0.2	0.2	0.2

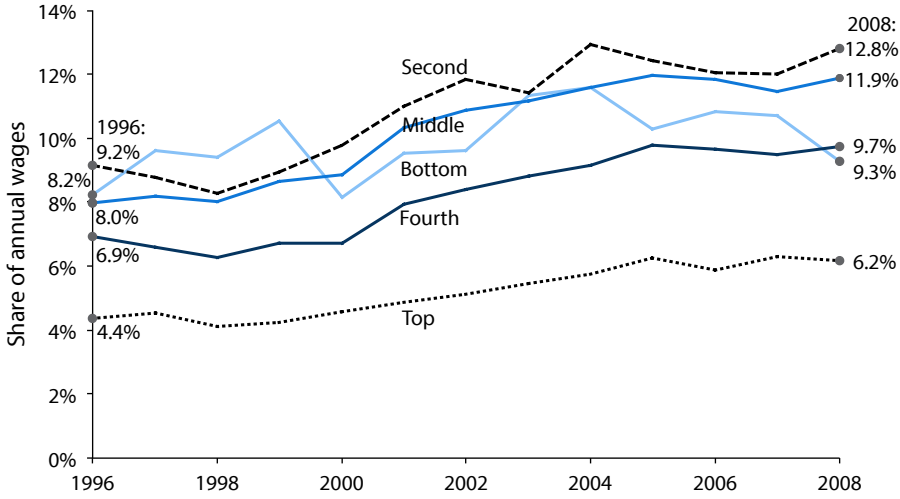
Source: Authors' analysis of Burtless and Milusheva (2012) based on Medical Expenditure Panel Survey

push up the health shares at the bottom. A third factor is that although health care benefits provided become increasingly expensive as one moves up the wage scale, the extent to which the quality of health benefits improves probably starts to diminish at some point, which would lead health care cost shares to diminish for higher-wage workers relative to low- and middle-wage workers.

Panel C in Table 4.27 shows the annual change in the health care cost share of annual wages during each period. Over the entire period, 1996–2008, health care costs relative to wages rose slightly more (0.1 percentage points faster per year) in the middle than the top, contributing modestly (1.2 percentage points) to the growth of the 90/50 wage ratio (which grew 12.1 percentage points, according to the annual data used for Table 4.4). This assumes that the wages and health care cost increases of workers at the 90th and 50th percentiles correspond to those of workers in the top and middle fifths, respectively. The difference between the growth of health care costs relative to wages in the middle and the bottom wage fifths was 0.2 percentage points a year over the 1996–2008 period and served to *narrow* wage differences between the middle and the bottom.

Panel C also provides information on the acceleration or deceleration of rising health care costs in the 2000s (2001–2008) relative to the late 1990s (1996–2001). Health care costs, relative to wages, grew faster in the 1990s than in the

Figure 4X Employer health care costs as a share of annual wages, by wage fifth, 1996–2008



Source: Authors' analysis of Burtless and Milusheva (2012) based on Medical Expenditure Panel Survey

2000s for the bottom three-fifths of wage earners, a pattern that suggests rising health costs cannot explain the deceleration of wage growth for this group (which encompasses the median) in the 2000s.

Figure 4X, which shows the annual trends for each fifth, illustrates that employer health care costs as a share of wages were relatively stable from 1996 to 2000 and from 2004/2005 through 2008, but rose steeply from 2000 to 2004/2005. The rise in health care costs thus preceded the slowdown in wages, which began in 2002 or 2003, depending upon the wage data series used. Rising health care costs might have contributed to the wage slowdown if there were a lag in the impact, but the slowdown in the rise in health care costs as a share of wages in 2004/2005 was not followed by any wage acceleration. All in all, other than slightly contributing to the narrowed wage gap between the middle and the bottom and to a slight expansion of the wage gap between the middle and the top (as explained earlier in this discussion), it is hard to see a major health care squeeze on wages explaining the recent trends in either wage growth or wage inequality overall and for the middle class.

These findings should be put into a broader context. They do not suggest that rising health care costs have had no material effect on pay or (more importantly) living standards. The steady increase in the share of total compensation accounted for by health care costs indeed has the potential to squeeze cash wages, and the

degree to which this increase is driven by excess health care inflation rather than more or better care is a drag on the growth of living standards. Over time, this accumulated slow and steady drag is not trivial, and if it continues for several more decades the accumulated damage to potential wage growth would be quite significant.

This analysis has examined only employer contributions to health care and their effect on wages. If workers and their families are devoting an ever-growing share of their own wages to insurance premiums or out-of-pocket costs for health care, then rising health costs will negatively affect living standards. An increase in taxes to cover the growing costs of health care paid for by government would have the same effect.

Trade and wages

The process of globalization since the 1980s has been an important factor in both slowing the growth rate of average wages and reducing the wage levels of workers with less than a college degree. In more recent years trade and globalization have begun to affect white-collar and college-educated workers to a great extent as well. The increase in international trade and investment flows affects wages through several channels. First, increases in imports of finished manufactured goods, especially from countries where workers earn only a fraction of what U.S. workers earn, reduce manufacturing employment in the United States. While increases in exports create employment opportunities for some domestic workers, imports mean job losses for many others. Large, chronic trade deficits over the last three decades suggest that the jobs lost to import competition have outnumbered the jobs gained from increasing exports. Given that export industries tend to be less labor intensive than import-competing industries, even growth in "balanced trade" (where exports and imports both increase by the same dollar amount) would lead to a decline in manufacturing jobs.

Second, imports of intermediate manufactured goods (used as inputs in the production of final goods) also help to lower domestic manufacturing employment, especially for production workers and others with less than a college education. The expansion of export platforms in low-wage countries has induced many U.S. manufacturing firms to purchase part of their production processes from low-wage countries. Since firms generally find it most profitable to purchase the most labor-intensive processes, the increase in intermediate inputs from abroad has hit non-college-educated production workers hardest.

Third, low-wage competition and greater world capacity for producing manufactured goods can lower the prices of many international goods. Since workers' pay is tied to the value of the goods they produce, lower prices from international competition, despite possible lower inflation, can lead to a reduction in the wages of U.S. workers, even if imports themselves do not increase.

Fourth, in many cases the mere threat of direct foreign competition or of the relocation of part or all of a production facility can lead workers to grant wage concessions to their employers. This is referred to as the "threat effect."

Fifth, the large increases in direct investment flows (i.e., investment in production plants and equipment) to other countries have meant reduced investment in the domestic manufacturing base and significant growth in foreign manufacturers' capacity to compete directly with U.S.-based manufacturers.

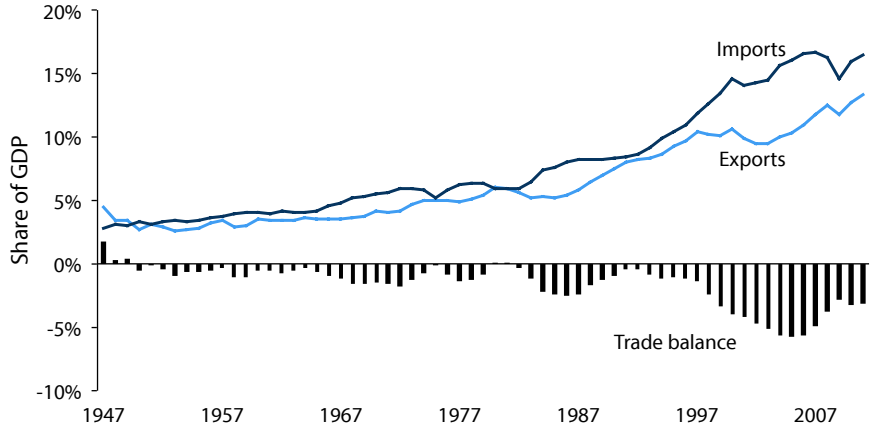
Sixth, the effects of globalization go beyond those workers exposed directly to foreign competition. As trade drives workers out of manufacturing and into lower-paying service jobs, not only do their own wages fall, but the new supply of workers to the service (or other) sectors (from displaced workers plus young workers not able to find manufacturing jobs) helps to lower the wages of similarly skilled workers already employed in service jobs. That is, globalization's impact is not just on those who are directly displaced by trade or face international competition but also on those workers with similar skills throughout the economy.

Last, trade in services has gained prominence in recent years as call center operations, computer programming, doctor support services (reading X-rays, for instance), research and development, and other white-collar services have been transferred (or purchased) abroad, sometimes to countries with far lower wages than those in the United States, most notably India and China. Less is known about this recent phenomenon, sometimes called "offshoring," but it seems to be a mechanism through which globalization now adversely affects white-collar jobs and wages (and will increasingly do so). Not only are jobs directly displaced, but the wage growth of still-employed white-collar workers threatened by offshoring is constrained.

This section briefly examines the role of international trade and investment in recent changes in the U.S. wage structure. Since the preceding list of channels through which globalization affects wages is not complete and not fully quantifiable, this analysis *understates* the impact of globalization on wages in the 1980s, 1990s, and 2000s.

Figure 4Y presents the trends in the imports and exports of goods as well as the size of the trade deficit in goods relative to GDP over the postwar period. Trade was balanced for the most part from 1947 through the end of the 1970s. A large deficit emerged in the mid-1980s as exports fell and imports continued to grow. Exports recovered after the fall-off in the dollar's value in the late 1980s and helped to close the deficit by the early 1990s. The goods trade imbalance spiked in the mid-1980s, rising to 2.6 percent of GDP (up 2.7 percentage points of GDP from 1980 to 1986). This escalation of the trade deficit and the rapid growth of imports are associated with a major restructuring of wages (and a fall in real wages for many workers) that occurred in the early 1980s. The trade deficit fell below 1.0 percent of GDP in the early 1990s before rising rapidly in the late 1990s to 4.0 percent of GDP in 2000. The pace quickened between 2000 and 2007,

Figure 4Y Imports, exports, and trade balance in goods as a share of U.S. GDP, 1947–2011

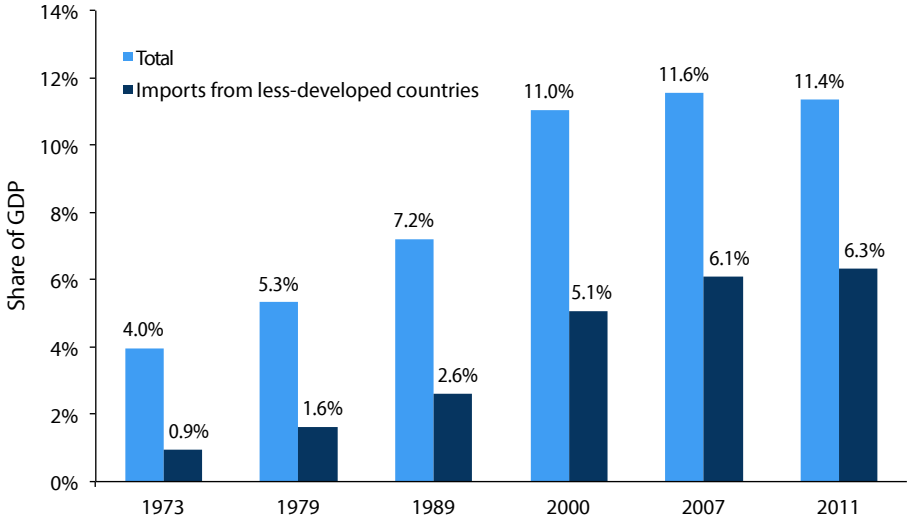


Source: Authors' analysis of Bureau of Economic Analysis National Income and Product Accounts

however, as the imbalance grew to 5.6 percent of GDP in 2004–2006. To the extent that the trade deficit is a proxy for trade's impact on wages of middle- and low-wage workers, the timing of growing trade deficits coincides with generally rising wage inequality during two recoveries, one in the late 1990s and the other in the early and mid-2000s.

An important characteristic of globalization has been the rising importance of trade with lower-wage, developing countries, especially since the end of the 1980s. This development is illustrated in **Figure 4Z** by the growth in the share of manufacturing imports originating in developing countries (measured as a share of GDP). In 1973, imports from low-wage countries equaled only 0.9 percent of GDP and, despite a rapid rise in imports in the 1980s, they reached only 2.6 percent of GDP in 1989. By 2000, however, imports from low-wage countries had nearly doubled in importance, registering 5.1 percent of GDP, and they grew even further to 6.1 percent of GDP by 2007, at which point they made up more than half of all manufacturing imports. By 2011 imports from low-wage countries had grown further to 6.3 percent of GDP even though manufacturing imports as a whole had declined. Industries subject to foreign competition have seen a growth of such competition over the last 30 years, and this competition increasingly comes from lower-wage countries. In fact, the rise in imports between 1979 and 2011 was primarily due to greater imports from low-wage nations: About three-fourths (4.7 percentage points) of the 6.0 percentage-point rise in manufacturing imports as a share of GDP was due to imports from low-wage countries.

Figure 4Z Manufacturing imports as a share of U.S. GDP, 1973–2011



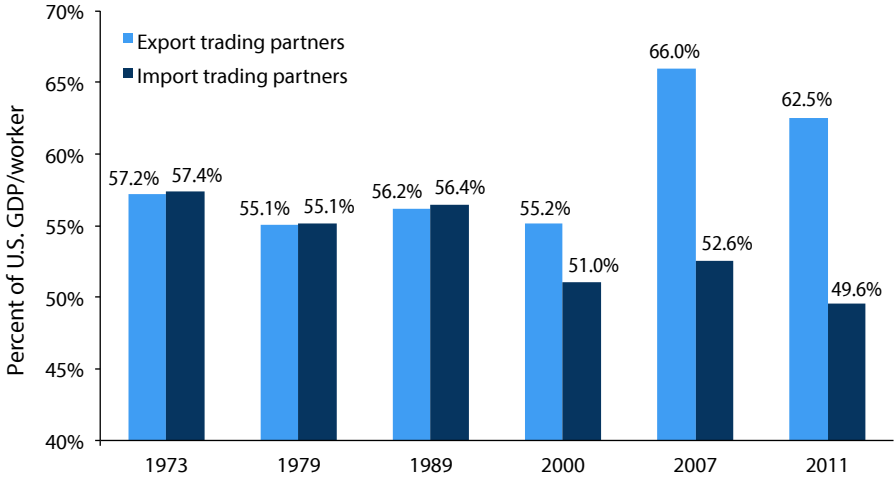
Source: Authors' analysis of USITC trade data and BEA National Income and Product Accounts

We further explore the changes in the composition of trade by examining the relative (to the United States) productivity levels of nations to which the United States exported and from which it received imports since the early 1970s. A nation's productivity level is an indicator of its wage level and its level of development; thus, a lower relative productivity level of our import partners indicates increased competition from developing, lower-wage countries. As **Figure 4AA** shows, U.S. export and import trading partners had equivalent productivity levels in 1973, at roughly 57 percent of U.S. productivity, and this parity prevailed through 1989. However, by 2000 the productivity levels of U.S. import trading partners had fallen. Between 2000 and 2011 our exports became increasingly focused on higher-productivity nations, and the productivity levels of the countries where our imports originate fell further. These trends imply that our trade imbalances with lower-wage nations grew in scale in the 2000s.

The growth in the trade deficit and increased global competition from lower-wage countries can, and would be expected to, adversely affect the wages of non-college-educated workers relative to others. This is because any potential gains from trade would be created through such a mechanism—a redeployment of workers and capital into more highly skilled or capital-intensive industries, a movement that lessens the need for non-college-educated workers.

We now turn to an examination of the types of jobs that were lost as trade competition and the trade deficit grew and as job losses in import-sensitive

Figure 4AA Relative productivity of U.S. trading partners, 1973–2011



Note: Bars show trading partners' productivity as a share of U.S. productivity.

Source: Authors' analysis of United States International Trade Commission Tariff and Trade DataWeb and the Penn World Table (Heston, Summers, and Aten 2011)

industries exceeded job gains in export industries. In periods of low unemployment, it may be the case that a trade deficit does not cause actual job loss because workers displaced by rising imports can find employment in nontraded sectors such as services. Nevertheless, even with low unemployment, a trade deficit will affect the composition of jobs (to less manufacturing and more services), thereby affecting wage inequality. In this light, **Table 4.28** indicates how trade flows affect the composition of employment by education level by separately showing the impact on those with a four-year college degree or more and those without a four-year college degree. This analysis relies on information on the types of jobs in each industry and the changes in imports and exports by industry. By using an input-output model, the analysis can examine how jobs across the economy are affected, including jobs that feed into other industries (e.g., how steel workers are affected by fewer car sales).

To examine the shifts in globalization's effects over time, it is worthwhile to first examine the 1980s, a period when large trade imbalances and related job losses became important and very visible to the public. In 1979 imports and exports were comparable, as were the numbers of jobs created by exports (3.1 million) and lost to imports (3.4 million). Translating these numbers into jobs by education level, we can see that manufacturing trade in 1979 cost 335,000 "less than college" jobs while generating 66,000 "college or more"

Table 4.28 Impact of trade balance in manufacturing on employment and wages, by education, 1979–2005

	1979	1989	2000	2005	Change 1979–2005
Trade *(millions of dollars)*					
Imports (M)	$112,235	$379,426	$1,012,856	$1,288,223	$1,175,988
Exports (X)	116,585	272,167	625,892	685,077	568,492
Net trade (X–M)	4,350	-107,259	-386,964	-603,146	-607,496
Trade-related employment *(thousands)*					
Imports (M)	3,412	5,623	10,910	9,936	6,525
Exports (X)	3,142	3,615	6,564	4,597	1,455
Net trade (X-M)	-269	-2,008	-4,346	-5,339	-5,070
Education intensity of trade *(share of jobs)*					
Imports (M)					
Less than college	89.8%	85.6%	79.0%	77.8%	-12.0%
College or more	10.2	14.4	21.0	22.2	12.0
Exports (X)					
Less than college	86.8%	80.9%	76.6%	73.5%	-13.3%
College or more	13.2	19.1	23.4	26.5	13.3
Net trade *(X-M)* ***employment impact on:***					
Employment level (thousands)					
Less than college	-335	-1,891	-3,590	-4,354	-4,019
College or more	66	-117	-757	-985	-1,051
Total	-269	-2,008	-4,346	-5,339	-5,070
Relative employment (change as share of group employment)					
Less than college	-0.5%	-2.3%	-3.8%	-4.6%	-4.2%
College or more	0.4	-0.5	-2.1	-2.5	-2.9
Relative change	-0.8	-1.8	-1.7	-2.1	-1.3

Source: Bivens (2008)

jobs. After imports grew faster than exports in the 1980s, trade cost about 2 million jobs in 1989, with most of the job erosion (about 1.9 million) among jobs not requiring a college degree. In 1989, this job loss for non-college-educated workers was equivalent to a 2.3 percent loss in their employment, or

a 1.8 percent loss relative to the employment loss of college graduates (0.5 percent). Therefore, trade disproportionately affected the non-college-educated workforce. Consequently, non-college-educated and middle- and lower-wage workers disproportionately bore the costs and pressures of trade deficits and global competition in the 1980s.

Interestingly, trade-related job losses were more evenly spread across education levels in the 1990s. Trade flows in the 1990s led to a loss of noncollege jobs equivalent to 3.8 percent of their total by 2000, a 1.5 percentage-point increase over the 2.3 percent loss in 1989. In percentage-point terms, this increased loss is roughly the same as that among "college or more" jobs, which rose from a 0.5 percent loss in 1989 to a 2.1 percent decline in 2000. By 2005 the trade-imposed job losses among jobs not requiring a college degree totaled more than 4.3 million, or 4.6 percent of their total. Job loss among "college or more" jobs had grown to nearly a million in 2005, or 2.5 percent of their total. Nevertheless, the impact of trade on noncollege jobs was nearly double that on jobs requiring a college degree in 2005, so that employment of those without a college degree fell 2.1 percent relative to employment of those with a college degree. Thus, the pattern of job erosion due to trade depressed opportunities for non-college-educated workers relative to those with more education.

The last column in Table 4.28 shows the changes over the 1979–2005 period: a loss of about 4 million noncollege jobs and an erosion of their relative employment of 1.3 percent. This analysis probably overstates the adverse trade impact on the higher education group because of one of its underlying assumptions: that when an industry loses jobs, it does so proportionately across types of jobs (e.g., a 10 percent loss of jobs in an industry means 10 percent fewer jobs in each category within the industry). Since the response to lost export opportunities or displacements from greater imports has almost surely fallen disproportionately on the non-college-educated workforce of each industry (rather than on white-collar or technical workers), this analysis understates the degree to which trade and globalization affect non-college-educated workers relative to those with college degrees.

The data presented so far suggest that trade, particularly with low-wage developing countries, accelerated the long-term decline in manufacturing and related employment. The data also suggest that the fall in employment opportunities was especially severe for non-college-educated manufacturing production workers. Since millions of trade-displaced workers sought jobs in nonmanufacturing sectors, trade also worked to depress the wages of comparable workers employed outside manufacturing. The result has been to weaken the wages of middle- and low-wage workers relative to those of high-earning workers.

It is difficult to quantify the other channels, discussed at the beginning of this section, through which the increase in international trade and investment flows affects wages—channels such as the threat effect of imports and plant relocation

on U.S. manufacturing wages and the reality of large-scale international direct investment flows. Nevertheless, these effects are likely to be as large as, or larger than, those that are more readily quantifiable.

To gauge the impact of globalization, particularly the rising competition from lower-wage nations, on wages and wage inequality, we examine the results of a "computable general equilibrium" model developed by economist Paul Krugman in the mid-1990s. What drives this model's estimates of the impact of trade on wage inequality is the share of trade coming from low-wage developing countries. The model answers two questions: How much would global prices (both of products and labor) have to change in order to make goods from less-developed countries unprofitable to send to the U.S. market, and how much would U.S. wages change in response? In other words, what would U.S. wages (and domestic product prices) be but for the opportunity to trade with less-developed countries? The larger the real-world share of trade with less-developed countries in any given year, the larger the hypothetical change in prices and wages needed to zero it out, and the larger the impact of trade on American wages. All imports in this analysis are manufacturing imports originating from less-developed countries (excluding services, oil, and other natural resource imports). The model assesses the impact of this trade on the hourly wage differential between those with a college degree or more and other workers (with this latter category combining those with "some college," high school, or "less than high school" educations); this differential is referred to as the college/noncollege wage gap.

In 1979, when such trade with less-developed countries made up just 1.8 percent of GDP, the model shows a modest 2.7 percent widening of the college/noncollege wage gap as a result of this trade (**Table 4.29**). In 1995, when trade with low-wage nations had risen to 3.6 percent of GDP, the relative impact on the wage gap was correspondingly higher, at 5.6 percent. However, between 1979 and 1995 developing-country trade's growing impact on the wage gap (a 2.9 percentage-point increase) was equivalent to 16.7 percent of the 17.2 percentage-point rise in the college/noncollege wage gap in this period. By 2011 the trade share from low-wage countries had risen to 6.4 percent of GDP, substantially greater than the 2.5 percent share in 1989. The wage impact of this increased trade from low-wage countries was 10.0 percent in 2011, 4.4 percentage points higher than in 1995. Because the college/noncollege wage gap rose only modestly in this period, from 46.1 percent in 1995 to 50.9 percent in 2011, the increased impact of trade on relative wages (a rise of 4.4 percentage points) accounted for 93.4 percent of the growth of the college/noncollege wage gap since the mid-1990s. Thus, increased competition from low-wage countries has been a strong factor pushing toward greater wage inequality since 1995, and without it the growth in the gap would have been trivial, from 46.1 percent to 46.5 percent. Over the entire 1979–2011 period, trade from low-wage nations caused a 7.3 percentage-point rise in

Table 4.29 Impact of trade with low-wage countries on college/noncollege wage gap

								Change		
	1973	1979	1989	1995	2000	2007	2011	1979–1995	1995–2011	1979–2011
Manufacturing trade penetration *(as share of GDP)**										
Less-developed country (LDC) **trade**	1.0%	1.8%	2.5%	3.6%	4.6%	5.6%	6.4%	1.8	2.8	4.7
China trade	0.0	0.0	0.2	0.5	0.8	1.8	2.0	0.5	1.6	2.0
College/noncollege wage gap*										
	36.9%	28.9%	41.5%	46.1%	48.2%	49.2%	50.9%	17.2	4.8	22.0
Estimated impact of trade on college/noncollege wage gap										
All LDC trade	1.6%	2.7%	4.0%	5.6%	7.3%	8.8%	10.0%	2.9	4.4	7.3
China trade***	0.0	0.0	0.3	0.7	1.2	2.8	3.2	0.7	2.5	3.2
Trade share of college/noncollege wage gap								***Percent of change***		
All LDC trade	4.3%	9.5%	9.5%	12.1%	15.0%	17.9%	19.7%	16.7%	93.4%	33.2%
China trade***	0.0	0.1	0.6	1.6	2.5	5.7	6.3	4.1	51.6	14.4

* "Penetration" is the average of the import share and the trade share to reflect current imbalance but also impact of balanced trade.
** Log hourly wage differential between those with a college or advanced degree and all other workers
*** Based on China share of LDC trade share, which assumes China trade impact equals other LDC trade impact

Source: Update of Bivens (2008) reanalysis of Krugman (1995) using 2011 USITC and NIPA data

the college/noncollege wage gap, accounting for a third of the entire growth in this education wage differential.

Much of the growth in U.S. trade with less-developed countries has originated from China, and Table 4.29 provides an estimate of the impact of the growth of U.S.-China trade on the college/noncollege wage gap. These estimates simply apportion to China an impact based on its share of less-developed country imports. Trade with China grew by 1.6 percentage points of GDP from 1995 to 2011, accounting for more than half of the total growth (2.8 percentage points of GDP) in less-developed country imports. Consequently, the trade with China served to expand the college/noncollege wage gap by 2.5 percentage points, or 51.6 percent of the total 4.8 percentage-point growth in the college/noncollege wage gap from 1995 to 2011.

In the early 2000s globalization's adverse impacts seemed to be moving upscale, affecting so-called knowledge workers such as computer programmers, scientists, and doctors as work previously performed in the United States was relocated to other countries. This phenomenon of offshoring high-tech, white-collar work is noteworthy because the workers affected, especially computer-related professionals, are frequently discussed as the winners in the globalization process. If the jobs of such highly educated workers are now at risk in the global economy, it makes one wonder which jobs cannot be moved offshore.

Two factors seem to have made offshoring of white-collar work a potentially significant phenomenon. One is that technology, particularly fast Internet and other communications technology, makes coordination and transmission of work worldwide much easier. A second factor is what could be called a "supply shock" arising from the availability of millions of highly educated workers in places such as China, India, Eastern Europe, Russia, and elsewhere who are willing to do the work for a lower wage than U.S. workers.

Hard data that could inform us of the extent of offshoring and how much more to expect in the future are not available because our data systems are not well suited to measuring trade in services (including that which is transferred over the Internet) as opposed to goods. Even if the current level of offshoring is modest, the high public profile of this practice and the statements from firms of their intentions to intensify their offshoring are sufficient to depress wage expectations in the relevant labor markets.

Offshoring has also emerged as a concern for many workers at a time when the labor market for college-educated workers, especially new college graduates, has not been robust. As discussed earlier, wages of entry-level college graduates have declined since 2000, and employer benefits provided to new graduates have diminished as well. The review of unemployment and employment trends in Chapter 5 describes a number of employment problems confronting college graduates.

Table 4.30 shows the results of two methods of assessing how vulnerable jobs are to offshoring. The first is presented in Panel A and relies on an analysis of which occupations are most offshorable. It then uses the occupational results to characterize the education and skill requirements of the particular jobs that are most offshorable. Each occupation was rated as either highly offshorable, offshorable, highly non-offshorable, or non-offshorable. Given these ratings and information about the total employment level and the education and skill requirements of each occupation, it is possible to determine the amount of employment that falls into each category and the characteristics of jobs in each. Offshorable or highly offshorable in this context denotes, based on the nature of the job, whether the work is *potentially* offshorable. Only a fraction of such jobs will actually be offshored; nevertheless, just the potential of being offshored will likely suppress wage growth in these occupations.

Table 4.30 Characteristics of offshorable and non-offshorable jobs

A. Analysis of occupations	Highly offshorable	Offshorable	Non-offshorable	Highly non-offshorable	All
Total offshorable employment					
Level	9,517,000	22,116,667	9,525,167	104,976,167	146,135,001
Share	6.5%	15.1%	6.5%	71.8%	100.0%
Annual salary	$36,246	$42,775	$33,116	$33,020	$34,713
By education *(percent)*					
High school or less	28.5%	42.4%	41.4%	45.2%	43.5%
Some college	37.8	27.0	35.6	27.7	28.8
College or more	33.8	30.6	23.0	27.1	27.8
Total	100.0	100.0	100.0	100.0	100.0

B. Survey methods	Percent offshorable		
	Self-classified	Inferred	Externally coded
Less than high school	18.6%	14.3%	11.8%
High school or GED	17.3	19.8	19.3
Some college	22.4	22.1	23.8
Associate degree	22.9	22.8	17.1
College degree	34.6	42.8	26.4
Advanced or professional degree	37.0	38.5	16.9

Source: Authors' analysis of Bernstein, Lin, and Mishel (2007); Blinder (2007); Blinder and Krueger (2009, Table 4); and Bureau of Labor Statistics Occupational Employment Statistics

This occupational analysis shows that 6.5 percent of employment is highly offshorable and another 15.1 percent is offshorable, translating into about 31.6 million of today's jobs that are vulnerable to future offshoring. This group of vulnerable occupations is more than three times the employment of the manufacturing sector. More of the highly offshorable occupations require at least a college degree (33.8 percent of the jobs) than do the jobs that are in either of the non-offshorable categories (23.0 percent and 27.1 percent). Likewise, the jobs most vulnerable to being offshored are more likely to require some college, indicating that they are middle-wage jobs. Occupations in the offshorable category have somewhat more education requirements than the average in the economy (30.6 percent require a college degree or more versus 27.8 percent economy-wide).

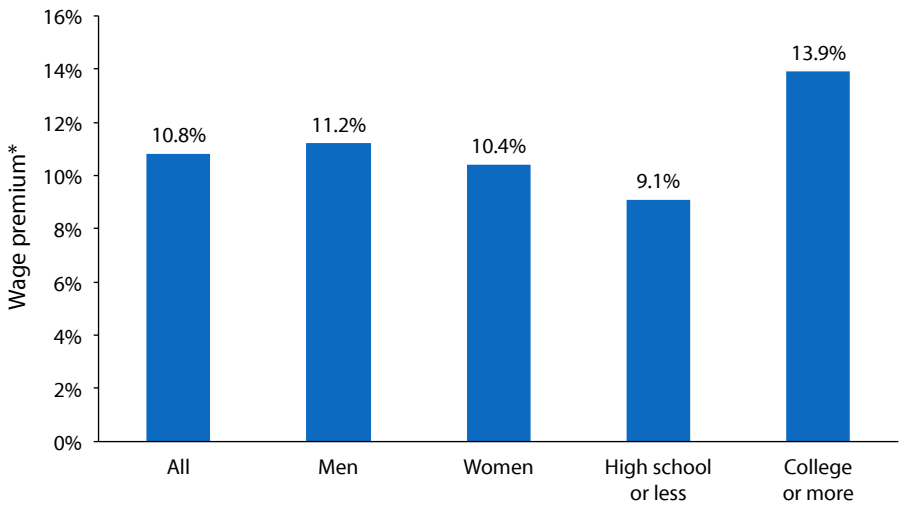
It is interesting to note that occupations vulnerable to offshoring pay more than other occupations. For instance, the annual wages in the highly offshorable

and offshorable occupations are, respectively, $36,246 and $42,775, far higher than the roughly $33,000 of pay in both of the non-offshorable categories. **Figure 4AB** shows the wage premium of offshorable jobs, i.e., the percent more that such jobs pay than comparably skilled jobs that are not offshorable. Overall, offshorable occupations pay 10.8 percent more; among jobs requiring at least a college degree the offshorable jobs pay 13.9 percent more. This analysis seems to confirm fears that offshoring threatens some of the best U.S. jobs, both in terms of their pay and the education required to obtain them.

The second method of assessing the potential for offshoring in particular occupations is presented in Panel B of Table 4.30. The researchers used three methods of analyzing survey data to determine whether a job was offshorable. The first, called "self-classified," asked survey respondents to assess whether their job is offshorable based on the difficulty someone in a remote location would have in performing the job. The second method, "inferred," used information on the nature of a respondent's job to assess whether it is offshorable. The third method, "externally coded," used professional coders to assess offshorability based on respondents' descriptions of their job tasks. For all three methods, the share of jobs that are offshorable was generally higher the more education the job required.

That offshorable jobs are highly paid and require above-average education credentials tells us that globalization will assert greater downward pressure on the wages of these vulnerable jobs and jobs like them throughout the economy.

Figure 4AB Wage premium of offshorable jobs, by gender and education



* The percent more that such jobs pay than comparably skilled jobs that are not offshorable

Source: Bernstein, Lin, and Mishel (2007)

It does not follow, however, that globalization will be more of a burden to the more highly educated and better-paid workforce; globalization will be increasingly evident in greater import flows and international competition in a wide variety of industries and occupations that have already experienced competition from producers in low-wage countries—an impact, as we have seen, that has disproportionately fallen on the non-college-educated workforce. Though white-collar workers have started to face more international competition, it may be a while before they face as much as do typical blue-collar workers.

Immigration

Another aspect of globalization is immigration. Immigrants' share of the U.S. labor force declined over the first half of the last century but began to grow in the 1970s. **Table 4.31** shows the immigrant share of the workforce from 1940 to 2011 for all immigrants and for those from Mexico, the largest single source

Table 4.31 Mexican and other immigrants' share of U.S. workforce, by gender, 1940–2011

	Share of workforce* (Decennial Census)							Share of workforce* (CPS)		Change		
	1940	1950	1960	1970	1980	1990	2000	2000	2011	1980–1990	1990–2000	2000–2011
Immigrants												
All	9.8%	7.3%	6.0%	5.2%	6.5%	8.8%	13.2%	13.4%	16.2%	2.3	4.4	2.8
Mexican	0.3	0.4	0.4	0.4	1.1	2.0	4.0	3.9	5.1	0.9	2.0	1.2
Other	9.5	6.9	5.6	4.8	5.4	6.8	9.2	9.6	11.1	1.4	2.4	1.5
Immigrant men												
All	10.9%	7.8%	6.1%	5.0%	6.4%	9.4%	14.5%	15.0%	17.9%	3.0	5.1	2.9
Mexican	0.4	0.4	0.4	0.5	1.3	2.5	5.1	5.0	6.4	1.2	2.6	1.4
Other	10.5	7.4	5.7	4.5	5.1	6.9	9.4	10.0	11.5	1.8	2.5	1.5
Immigrant women												
All	6.9%	6.0%	5.9%	5.4%	6.5%	8.2%	11.7%	11.6%	14.2%	1.7	3.5	2.6
Mexican	0.2	0.2	0.3	0.3	0.9	1.4	2.8	2.5	3.5	0.5	1.4	1.0
Other	6.7	5.8	5.6	5.1	5.6	6.8	8.9	9.1	10.7	1.2	2.1	1.6

* Population 18 to 64 years old

Source: Borjas and Katz (2005, Figure 1) and authors' analysis of Current Population Survey basic monthly microdata

country today. These data indicate that the growth in immigrant workers' share of the labor force nearly doubled in each decade starting in 1970 through 2000; the immigrant share grew 1.3 percentage points in the 1970s, 2.3 percentage points in the 1980s, and 4.4 percentage points in the 1990s. The immigrant share continued to grow between 2000 and 2007 but at a somewhat slower annual rate than in the 1990s, and there was minimal growth during the recessionary years from 2007 to 2011. By 2011 immigrants made up 16.2 percent of the workforce, more than triple the share in 1970. Immigration from Mexico contributed 42.4 percent of the growth in immigrants as a share of the workforce between 1970 and 2011, with a greater role among men.

A rise in immigration increases the available supply of labor in the United States and thus tends to reduce wages if all else is constant (which it rarely is). If one workforce group—say, those without a high school degree—experiences the largest growth in immigration, then that group will have wage growth inferior to (or real wage declines greater than) that of less-affected groups. Since the largest share of immigrants is found among those without a high school degree, native workers without a high school education would be most affected by immigration. (Recall from Table 4.17 that 5.1 percent of the native-born workforce had less than a high school education in 2011, compared with 25.9 percent of immigrant workers.) A particular concern is whether new immigrants adversely affect the relative employment and wages of other disadvantaged populations (e.g., the less-educated portion of the black workforce, native Hispanics, and Hispanics who immigrated some time ago) where a disproportionate share of workers lack a high school degree. The impact of immigrants on native-born workers' relative wages could also be felt by those with high school degrees or above to the extent these workers compete for jobs in the same occupations and industries.

One offsetting factor is that immigrants may be "complements" to, rather than "substitutes" for, native-born workers; in other words, immigrant workers can facilitate the employment of other workers (presumably more-skilled workers) or raise the effectiveness of capital investments (thereby raising productivity). This does not have to be a case of being perfect substitutes or complements, as there may be varying degrees of complementarity. (An illustration of complementarity is that native workers are more likely to concentrate in jobs that require strong English skills, and immigrants tend to concentrate in jobs that do not. For example, in restaurant jobs, natives might be waiters and waitresses and immigrants might be dishwashers.)

Also, the increased supply of immigrant workers could in some circumstances be offset by a rapid growth in demand for those particular types of workers. Unfortunately, economic analyses have been unable to clearly identify the impact of increased immigration on the absolute wages and employment of other workers. However, a consensus exists that immigration heavily weighted toward those lacking a high school degree or having just a high school degree will increase

wage inequality at the bottom; it may not force wages of the "less educated" to fall, but it will lead these wages to rise less than wages of workers with more education.

A first step in understanding the impact of immigration is to examine the gender and education composition of immigrants so as to assess which demographic groups are affected. **Table 4.32** shows the composition of the immigrant workforce by education and gender and divides the immigrants into those from Mexico and those from other nations. In 2011, a majority of Mexican immigrants,

Table 4.32 Educational attainment of immigrants, by gender, 1940–2011

	Share of workers (Decennial Census)							**Share** (CPS)	
	1940	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**	**2000**	**2011**
Mexican men									
High school (H.S.) **dropouts**	94.6%	91.2%	88.3%	82.6%	77.2%	70.4%	63.0%	64.6%	57.0%
H.S. graduates	3.0	6.7	6.7	11.7	14.3	19.0	25.1	22.2	28.3
Some college	1.0	1.5	2.7	3.6	5.7	7.8	8.5	9.3	9.7
College graduates	1.4	0.6	2.4	2.2	2.9	2.8	3.4	3.8	5.1
Non-Mexican men									
H.S. dropouts	84.4%	76.4%	64.5%	45.5%	30.2%	21.0%	17.0%	18.5%	14.6%
H.S. graduates	9.2	14.5	16.8	23.9	26.7	26.0	25.8	24.6	24.5
Some college	2.8	4.0	8.3	11.7	15.2	21.3	20.9	19.7	19.9
College graduates	3.7	5.1	10.4	18.9	27.9	31.7	36.3	37.3	41.0
Mexican women									
H.S. dropouts	84.5%	82.4%	83.9%	77.3%	72.9%	64.7%	57.0%	57.3%	48.5%
H.S. graduates	12.5	10.3	11.4	16.9	17.7	21.9	26.6	24.0	28.8
Some college	2.1	4.4	2.7	4.5	7.0	10.5	11.8	13.4	15.2
College graduates	0.9	2.9	2.0	1.4	2.4	3.0	4.5	5.2	7.6
Non-Mexican women									
H.S. dropouts	79.2%	68.5%	59.3%	43.9%	30.1%	20.0%	15.5%	16.6%	12.1%
H.S. graduates	15.8	22.3	25.5	33.7	35.2	31.1	27.6	27.1	24.7
Some college	2.8	5.0	9.6	12.6	16.8	24.0	24.4	22.6	23.2
College graduates	2.2	4.2	5.7	9.9	17.9	24.9	32.6	33.7	40.0

Source: Borjas and Katz (2005, Table 2) and authors' analysis of Current Population Survey basic monthly microdata

57.0 percent of men and 48.5 percent of women, did not have a high school education. Among non-Mexican immigrants the share without a high school degree (12.1 percent of women and 14.6 percent of men) was also larger than among native workers (5.1 percent, as seen in Table 4.17). Thus, immigration disproportionately adds to the supply of "less than high school" or "dropout" workers relative to other education levels: Half of the workforce in this group are immigrants while only 5.1 percent of native workers lack a high school credential.

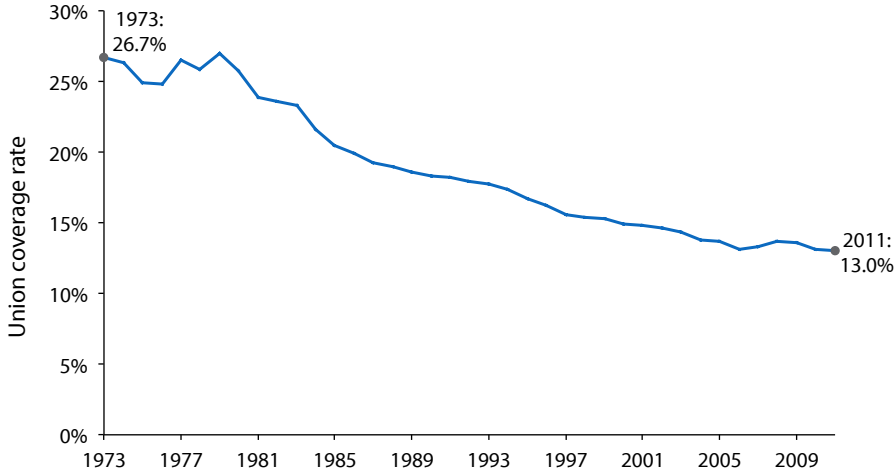
At the other end of the education spectrum, Table 4.17 showed a slightly greater share of immigrants than native workers with advanced degrees, 12.3 percent versus 11.1 percent. However, more natives (22.7 percent) than immigrants (17.9 percent) have a college degree. Table 4.32 shows that non-Mexican immigrants are more likely to be college graduates (which includes those with advanced degrees) than native workers. For instance, roughly 40 percent of non-Mexican immigrants in 2011 had at least a college degree, a "college intensity" exceeding the roughly one-third of native workers with a college degree or higher (Table 4.17). The college intensity of non-Mexican immigrants has grown strongly in each decade among both men and women. Therefore, the impact of growing immigration has been broadly and increasingly felt, including among those with college or advanced degrees. To the extent that college-educated immigrants are substitutes for native college graduates, then immigration may have put downward pressure on the wages of those with a college degree or more and *lessened* wage inequality between high- and middle-wage earners.

As noted, the degree to which immigration adversely affects the wages of particular groups of workers, if at all, is a matter of some dispute among economists. Given the expected downward pressure on the wages of low-wage workers from increased immigration (assuming substitution between immigrants and natives), it is surprising that, while immigration grew faster in the 1990s, the wages at the bottom did better in the 1990s than in the 1980s and that, correspondingly, the 50/10 wage gap has been stable or declining since the late 1980s. However, two sets of increases in the minimum wage and many years of persistent low unemployment in the late 1990s may have offset the impact of immigration. There is not much evidence of an adverse impact of immigration on wages at the bottom in the 2000s. As Figures 4K and 4L showed, there was a fairly stable wage gap between the middle and the bottom in the 2000s. The 50/10 wage gap did grow among men during the current recessionary period, but during that time male immigration was stagnant and therefore unlikely to be associated with this trend.

Unionization

The percentage of the workforce represented by unions was stable in the 1970s but fell rapidly in the 1980s and continued to fall in the 1990s and the early

Figure 4AC Union coverage rate in the United States, 1973–2011



Source: Authors' analysis of Hirsch and Macpherson (2003) and updates from the *Union Membership and Coverage Database*

2000s, as shown in **Figure 4AC**. This falling rate of unionization has lowered wages, not only because some workers no longer receive the higher union wage but also because there is less pressure on nonunion employers to raise wages; the spillover or threat effect of unionism and the ability of unions to set labor standards have both declined. The possibility that union bargaining power has weakened adds a qualitative shift to the quantitative decline. This erosion of bargaining power is partially related to a harsher economic context for unions because of trade pressures, the shift to services, and ongoing technological change. However, analysts have also pointed to other factors, such as employers' militant stance against unions and changes in the application and administration of labor law, that have helped to weaken unions and their ability to raise wages.

Table 4.33 presents estimates of the union wage premium computed to reflect differences in hourly wages between union and nonunion workers who are otherwise comparable in experience, education, region, industry, occupation, and marital status. The union premium is presented as the extra dollars per hour and the percentage-higher wage earned by those covered by a collective bargaining contract. This methodology yields a union premium of 13.6 percent overall—17.3 percent for men and 9.1 percent for women.

Sizable differences exist in union wage premiums across demographic groups, with blacks and Hispanics having union premiums of 17.3 percent and 23.1 percent, respectively, far higher than the 10.9 percent union premium for whites.

Table 4.33 Union wage premium by demographic group, 2011

Demographic group	Percent union*	Union premium**	
		Dollars	Percent
Total	**13.0%**	**$1.24**	**13.6%**
Men	13.5	2.21	17.3
Women	12.5	0.67	9.1
White	**13.3%**	**$0.76**	**10.9%**
Men	14.1	1.79	14.9
Women	12.5	0.18	7.0
Black	**15.0%**	**$2.60**	**17.3%**
Men	15.8	3.05	20.3
Women	14.4	2.25	14.8
Hispanic	**10.8%**	**$3.44**	**23.1%**
Men	10.8	4.77	29.3
Women	10.7	2.06	15.7
Asian	**11.1%**	**$1.54**	**14.7%**
Men	9.9	1.53	16.6
Women	12.4	1.61	12.9
New immigrants (less than 10 years)			
Men	5.4%	$0.49	16.0%
Women	7.0	2.74	16.2
Other immigrants (more than 10 years)			
Men	10.4%	$2.13	16.7%
Women	12.7	0.57	8.8

* Union member or covered by a collective bargaining agreement

** Regression-adjusted hourly wage advantage of being in a union, controlling for experience, education, region, industry, occupation, race/ethnicity, and marital status

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

Consequently, unions raise the wages of minorities more than of whites (the wage effect of unionism on a group is calculated as the unionism rate times the union premium), helping to close racial/ethnic wage gaps. Hispanic and black men tend to reap the greatest wage advantage from unionism, though minority women have substantially higher union premiums than their white counterparts. Unionized Asians have a wage premium somewhat higher than that of whites.

Unionized immigrant male workers obtain a premium comparable to that of male workers overall, whether they have immigrated relatively recently (within 10 years) or further back in time. Women who have immigrated recently have a higher union premium than women overall, 16.2 percent versus 9.1 percent. Immigrant women who have been in the United States more than 10 years have a union premium comparable to that of women overall.

Table 4.34 provides information on the union premium for three nonwage dimensions of compensation: health insurance, pensions, and paid time off. The first two columns present the characteristics of compensation in union and nonunion settings. The difference between the union and nonunion compensation packages is presented in two ways, unadjusted (simply the difference between the first two columns) and adjusted (for differences in characteristics other than union status, such as industry, occupation, and establishment size). The last

Table 4.34 Union premiums for health, retirement, and paid leave benefits

	Union	Nonunion	Difference		Union premium
			Unadjusted	Adjusted*	
Health insurance					
Percent covered	83.5%	62.0%	21.5	17.5	28.2%
Employee deductible	$200	$300	-$100	-$54	-18.0%
Employer share					
Single plan	88.3%	81.8%	6.5	9.1	11.1%
Family plan	76.3%	64.9%	11.4	10.1	15.6%
Retiree health coverage	76.6%	59.8%	16.7	14.6	24.4%
Pension					
Percent covered	71.9%	43.8%	28.1	23.6	53.9%
Employer costs (per hour)					
Defined benefit	—	—	—	$0.39	36.1%
Defined contribution	—	—	—	-0.11	-17.7%
Time off					
Vacation weeks	2.98	2.35	0.63	—	26.6%
Paid holiday/vacation (hours)	—	—	—	22.2	14.3%

* Adjusted for establishment size, occupation, industry, and other factors. Adjusted difference is used to calculate premium.

Source: Buchmueller, DiNardo, and Valletta (2001) and Mishel and Walters (2003, Table 4)

column presents the union premium, the percentage difference between union and nonunion compensation, calculated using the adjusted difference.

These data show that a union premium exists in every dimension of the compensation package. Unionized workers are 28.2 percent more likely to be covered by employer-provided health insurance, and their insurance is better: An 11.1 percent higher share of single-worker coverage is paid by the employer, and for family coverage the employer-paid share is 15.6 percent higher; deductibles are $54, or 18.0 percent, less for union workers; and union workers are 24.4 percent more likely to receive health insurance coverage in their retirement.

Similarly, 71.9 percent of union workers have employer-provided pensions, compared with only 43.8 percent of nonunion workers. When this difference is adjusted for characteristics other than union status, union workers are 53.9 percent more likely to have pension coverage. Union employers spend 36.1 percent more on defined-benefit plans but 17.7 percent less on defined-contribution plans. As defined-benefit plans are preferable, as discussed earlier, these data indicate that union workers are more likely to have the better form of pension plans.

Union workers also get more paid time off. Their nearly three weeks of vacation amount to about three days (0.63 weeks) more than nonunion workers receive. Including both vacations and holidays, union workers enjoy 14.3 percent more paid time off.

Table 4.35 provides a more refined analysis of the union wage premium by comparing the employer benefit costs in unionized settings with those in nonunion settings in comparable occupations and establishments, i.e., factories or offices. (Data are based on a survey of firms, whereas Table 4.34 used a survey of workers.) Specifically, the estimated union premium controls for the sector (public or private) in which the establishment is located, the establishment's size, the full-time or part-time status of its employees, and its detailed industry and region. Unionized workers are 18.3 percent more likely to have health insurance,

Table 4.35 Union impact on paid leave, pension, and health benefits

	Paid leave	Pension and retirement	Health insurance
Union impact on benefit incidence	3.2%	22.5%	18.3%
Union impact on benefit cost per hour			
Total impact	11.4%	56.0%	77.4%
Impact of greater incidence	3.4	28.4	24.7
Impact of better benefit	8.0	27.7	52.7

Source: Pierce (1999) and Mishel and Walters (2003, Table 3)

22.5 percent more likely to have pension coverage, and 3.2 percent more likely to have paid leave. Unionized employers pay more for these benefits because the benefits they provide are better than those offered by nonunion employers and because unionized employers are more likely to provide these benefits. For instance, unionized employers pay 77.4 percent more in health insurance costs per hour, 24.7 percent more because of the greater incidence and 52.7 percent because of the better benefit.

This analysis also shows that unionized employers pay 56.0 percent more per hour for pension plans, 28.4 percent from a greater incidence of providing pensions and 27.7 percent from providing better pensions. Similarly, unionized employers have 11.4 percent greater costs for paid leave, mostly because of the more extensive paid leave (the 8.0 percent "better benefit" effect).

The effect of the erosion of unionization on the wages of a segment of the workforce depends on the degree to which deunionization has taken place and the degree to which the union wage premium among that segment of the workforce has declined. **Table 4.36** shows the degree to which unionization and the union wage premium have declined by occupation and education level over the 1978–2011 period (1979 data were not available). These data, which are for men only, are used to calculate the effect of weakened unions (less representation and a weaker wage effect) over the period on the wages of particular groups and the effect of deunionization on occupation and education wage differentials. The focus, in particular, is on the role of deunionization on the widening wage differentials between blue-collar and white-collar occupations and between high school and college graduates.

Union representation fell dramatically among blue-collar and high school–educated male workers from 1978 to 2011. Among the high school–graduate workforce, unionization fell from 37.9 percent in 1978 to 14.9 percent in 2011, or by more than half. This decline obviously weakened the effect of unions on the wages of high school–educated workers. Because unionized high school graduates earned about 22 percent more than equivalent nonunion workers in 1978 (a premium estimated for this analysis, but not shown in the table, that declined to 17 percent in 2011), unionization raised the wage of the average male high school graduate (the "union wage effect") by 8.2 percent in 1978. Unions had a 0.9 percent impact on male college graduate wages in 1978, meaning that unions had the net effect of narrowing the college/high school wage gap by 7.3 percentage points in that year. The decline in union representation (and the lower union wage premium) from 1978 to 2011, however, reduced the union wage effect for male high school–educated workers to just 2.6 percent in 2011 while hardly affecting college graduates. Thus, unions closed the college/high school wage gap by only 2.0 percentage points in 2011. The lessened ability of unions to narrow this wage gap (represented by the drop from a 7.3 percent to a 2.0 percent narrowing effect)

Table 4.36 Effect of union decline on male wage differentials, 1978–2011

		1978	1989	2000	2011
Percent of workers in union *("union coverage")*					
By occupation	White collar	14.7%	12.1%	11.2%	10.3%
	Blue collar	43.1%	28.9%	23.1%	17.8%
	Difference	-28.4	-16.7	-11.9	-7.5
By education	College	14.3%	11.9%	13.1%	12.1%
	High school	37.9%	25.5%	20.4%	14.9%
	Difference	-23.6	-13.6	-7.4	-2.9
Union wage effect*					
By occupation	White collar	0.2%	0.0%	-0.2%	-0.2%
	Blue collar	11.5%	6.7%	4.3%	3.5%
	Difference (change in differential)	-11.3	-6.8	-4.5	-3.6
By education	College	0.9%	0.5%	0.9%	0.6%
	High school	8.2%	5.5%	3.1%	2.6%
	Difference (change in differential)	-7.3	-5.0	-2.3	-2.0
		1978–1989	**1989–2000**	**2000–2011**	**1978–2011**
Change in wage differential**	White-collar/blue-collar	5.0	4.2	0.9	10.1
	College/high school	13.0	8.0	2.8	23.9
Change in union wage effect	White-collar/blue-collar	-4.6	-2.3	-0.9	-7.7
	College/high school	-2.3	-2.5	-0.3	-5.1
Deunionization contribution to change in wage differential***	White-collar/blue-collar	-90.5%	-55.2%	-91.8%	-76.1%
	College/high school	-17.8	-30.7	-10.2	-21.2

* Union wage effect is "union wage premium" (estimated with simple human capital model plus industry and occupational controls) times union coverage; negative values in the difference row show how much unionization narrowed the wage gaps.

** Log wage gaps estimated with a simple human capital model

*** Change in union wage effect on wage differential divided by overall change in differential

Source: Authors' update of Freeman (1991) using Current Population Survey Outgoing Rotation Group microdata

contributed 5.1 percentage points to the rise in the college/high school wage differential from 1978 to 2011 (shown in the "Change in union wage effect" portion of the table). This is equal to 21.2 percent of the total rise in this wage gap (shown in the "Deunionization contribution to change in wage differential" portion of the table). In other words, deunionization can explain about a fifth of the growth in the college/high school wage gap among men between 1978 and 2011.

The weakening of unionism had an even larger effect on blue-collar workers and on the wage gap between blue-collar and white-collar workers. The 43.1 percent unionization rate among blue-collar workers in 1978 and their 26.6 percent union wage premium (not shown in the table) boosted average blue-collar wages by 11.5 percent, thereby closing the white-collar/blue-collar wage gap by 11.3 percentage points in that year. The union impact on this differential declined as unionization and the union wage premium decreased, such that unionism reduced the white-collar/blue-collar differential by 3.6 rather than 11.3 percentage points in 2011, a 7.7 percentage-point weakening. This lessened effect of unionism can account for 76.1 percent of the 10.1 percentage-point growth of the white-collar/blue-collar wage gap between 1978 and 2011; the lessened effect was primarily driven by the enormous decline of unionism among blue-collar men, from 43.1 percent in 1978 to just 17.8 percent in 2011. In that 33-year period unionism among blue-collar workers lost much of its ability to set wage patterns and standards. The impact of this decline in unionization is underestimated here because it does not take account of the union impact on nonunion workers' wages.

Unions reduce wage inequalities because they raise wages more at the bottom and in the middle of the wage scale than at the top. Lower-wage, middle-wage, blue-collar, and high school–educated workers are also more likely than high-wage, white-collar, and college-educated workers to be represented by unions. These two factors—the greater union representation and the larger union wage impact for low- and mid-wage workers—are key to unionization's role in reducing wage inequalities.

The larger union wage premium for those with low wages, in lower-paid occupations, and with less education is shown in **Table 4.37**. For instance, the union wage premium for blue-collar workers in 1997, 23.3 percent, was far larger than the 2.2 percent union wage premium for white-collar workers. Likewise, the 1997 union wage premium for high school graduates, 20.8 percent, was much higher than the 5.1 percent premium for college graduates. The union wage premium for those with a high school degree or less, at 35.5 percent, was significantly greater than the 24.5 percent premium for all workers.

Table 4.37 presents a comprehensive picture of the impact of unions on wage inequality by drawing on the estimated union wage premiums for the different fifths of the wage distribution. The table presents the results of three different studies, and each demonstrates that the union premium is higher among lower-wage

Table 4.37 Union wage premium for subgroups

Subgroup	Percent union	Union wage premium*		
Occupation				
White collar (1997)	11.6%	2.2%		
Blue collar (1997)	20.8	23.3		
Education				
College (1997)	10.4%	5.1%		
High school (1997)	23.6	20.8		
All (1992, 1993, 1996)	n.a.	24.5		
High school or less	n.a.	35.5		
Wage distribution		***Estimated union wage premium***		
		Study 1	**Study 2**	**Study 3**
Bottom fifth	4.9%	17.2%	20.6%	24.2%
Second fifth	8.9	21.8	16.8	34.6
Middle fifth	14.0	20.6	13.7	30.8
Fourth fifth	20.3	15.5	10.7	24.5
Top fifth	19.1	12.4	6.1	6.1
Average effect		**19.0%**	**11.9%**	**n.a.**
Percent bottom 40% to top 40%	35%	140	223	193%

* Percent by which the wages of those covered by collective bargaining agreements exceed wages of comparable nonunion workers

Source: Mishel and Walters (2003, Table 2.3a); Gunderson (2003, Table 5.1 and Appendix C); and premium estimates by fifth from: 1) Gittleman and Pierce (2007), 2) Schmitt (2008), and 3) Card, Lemieux, and Riddell (2002). Union coverage by fifth from Schmitt (2008)

workers than among the highest-wage workers. This is illustrated in the last row, which shows the premium of the bottom two-fifths of earners as a percent of the premium of the top two-fifths; the results range from 140 percent to 223 percent. These numbers illustrate that unions generate a less unequal distribution of wages in the unionized sector by raising the wages of low- and middle-wage workers more than those of higher-wage workers. That is, lower-wage workers benefit more than higher-wage workers from coverage by a collective bargaining agreement. The countervailing factor, however, is that unionization rates are lower for low-wage workers than other workers.

There are several ways that unionization's impact on wages goes beyond the workers covered by collective bargaining agreements and extends to nonunion

wages and labor practices. For example, in industries, occupations, and regions in which a strong core of workplaces are unionized, nonunion employers will frequently meet union standards or at least improve their compensation and labor practices beyond what they would have provided in the absence of a union presence. As noted earlier, this dynamic—the degree to which nonunion workers are paid more because their employers are trying to forestall unionization—is sometimes called the union threat effect.

A more general mechanism (without any specific "threat") through which unions affect nonunion pay and practices is the institution of norms and practices that have become more widespread throughout the economy, thereby improving pay and working conditions for the entire workforce. These norms and practices have particularly benefited the roughly 70 percent of workers who are not college educated. Many fringe benefits, such as pensions and health insurance, were first provided in the union sector and then became more commonplace. Union grievance procedures, which provide due process in the workplace, have been adapted to many nonunion workplaces. Union wage setting, which has gained exposure through media coverage, has frequently established standards for what workers expect from their employers. Until the mid-1980s, in fact, many sectors of the economy followed the patterns set in collective bargaining agreements. As unions have weakened, especially in the manufacturing sector, their ability to set broader patterns has diminished. However, unions remain a source of innovation in work practices (e.g., training and worker participation) and in benefits (e.g., child care, work-time flexibility, and sick leave).

A new study has focused attention on the impact on wages and wage inequality of declining unionization of industries in particular regions. **Table 4.38** presents the results of this study, which examined the direct impact of lower unionization, and also the impact of falling unionization, in industries within particular regions (using 18 industries and four regions) on the wages of similarly located nonunion workers. It assesses the impact of these factors on both between-group wage inequality (recall from earlier that this is the wage difference between workers with different characteristics, such as education levels and experience) and within-group wage inequality (inequality of wages among workers with similar education and experience, for instance). Among men, wage inequality (measured by the variance of log wages) grew 0.102 between 1973 and 2007, 0.055 from higher between-group wage inequality and 0.046 from higher within-group wage inequality. The biggest impact of direct deunionization was on within-group inequality because of the increasing inequality among nonunion workers (as unions declined, similar workers started having more dissimilar wages). The direct impact of declining unionization accounted for 20.2 percent of the growth of overall male wage inequality, and the impact of declining unionization within particular industry/region groups (i.e., the weakening union impact on nonunion wages and standards) explained another 13.7 percent of the

Table 4.38 Impact of deunionization on wage inequality, 1973–2007

	Change in wage inequality		
	Between-group	Within-group	Total growth
A. Male wage inequality trends*			
Change in wage inequality	0.055	0.046	0.102
Direct deunionization effect	0.002	0.018	0.021
Union impact on nonunion wages and standards	-0.017	0.031	0.014
Share of inequality growth explained **			
Direct deunionization effect	3.2%	40.3%	20.2%
Union impact on nonunion wages and standards	-30.1	66.0	13.7
Total union effect	-26.9	106.3	33.9
B. Female wage inequality trends*			
Change in wage inequality	0.051	0.047	0.098
Direct deunionization effect	-0.003	0.004	0.001
Union impact on nonunion wages and standards	0.036	0.024	0.019
Share of inequality growth explained **			
Direct deunionization effect	-5.2%	9.2%	1.7%
Union impact on nonunion wages and standards	-10.9	50.6	18.7
Total union effect	-16.1	59.8	20.4

* Percentage-point change in variance of log wages
** From original source, which used nonrounded data

Source: Authors' analysis of Western and Rosenfeld (2011, Table 2)

growth of overall male wage inequality. Overall, deunionization can explain about a third (33.9 percent) of the growth of male wage inequality from 1973 to 2007.

Among women the decline in unions had little direct impact on within-group inequality (9.2 percent), but the diminished ability of unions to set labor standards (as women experienced the decline in industry/region unionization) had a large impact, explaining more than half the rise of within-group wage inequality. Altogether, deunionization generated about a fifth (20.4 percent) of the growth of overall wage inequality among women.

The decline of union coverage and influence adversely affects men more than women and middle-wage men more than lower-wage men. Consequently, deunionization has its greatest impact among men on the growth of the wage gap between workers at the 90th percentile of wages and the 50th percentile—the 90/50 wage gap. In this light, it is not surprising that the period of rapid decline of union coverage from 1979 to 1984 (during a deep recession, and at a time when the manufacturing sector was battered by the trade deficit) was also one in which the male 90/50 wage gap grew the most. Recall from Table 4.36 that male blue-collar unionization fell from 43.1 percent in 1978 to just 28.9 percent in 1989, a drop that contributed to the rapid growth of male wage inequality in the 1980s. The decline of unionization in the 1990s and 2000s put continued downward pressure on middle-wage men and contributed to the continued growth of the 90/50 wage gap between high- and middle-wage men. The erosion of unions, however, has also affected nonunion wages, and the consequence has been a sizable increase in wage inequality among women as well as men.

The decline in the real value of the minimum wage

Table 4.39 and **Figure 4AD** track changes in the value of the minimum wage. Legislated increases in the federal minimum wage in both 2007 and 2008 boosted it from $5.15 in 2006 to $7.25 in 2009, its highest level in real terms since 1981. But even after this nearly 41 percent increase, the minimum wage in 2009 was still 7.8 percent less than its value in 1967 (in 2011 dollars). After two years of inflation the minimum wage in 2011 was 12.1 percent below the 1967 level. The minimum wage declined steeply and steadily between 1979 and 1989, when inflation whittled it down from $8.38 to $5.87 (in 2011 dollars), a fall of 29.9 percent. The legislated increases in the minimum wage in 1990 and 1991 and again in 1996 and 1997 raised the value of the minimum wage from 1989 to 2000 by 14.6 percent (in 2011 dollars). The value grew another 7.8 percent from 2000 to 2011.

A more appropriate way to assess the level of the current minimum wage in historical terms is to examine the minimum wage's share of the average worker's wage (as measured by the average hourly earnings of production/nonsupervisory workers), as shown in **Figure 4AE**. In 2011, the minimum wage was worth only about 37 percent of what an average worker earned per hour, not far above its lowest point, reached in 2006, in 47 years. In contrast, the minimum wage's share of the average wage was about 50 percent in the late 1960s, about 45 percent in the mid-1970s, and about 40 percent in the early 1990s. This analysis shows that the earnings of low-wage workers have fallen significantly behind those of other workers, and that the decline in the real value of the minimum wage is a causal factor in rising wage inequality.

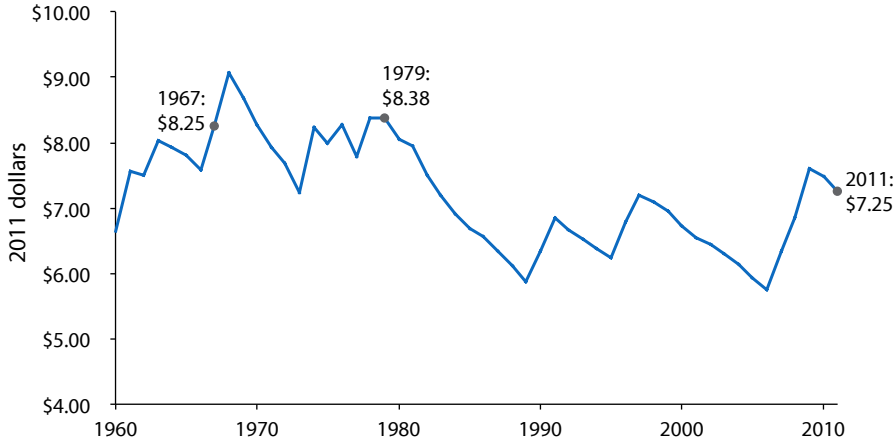
Table 4.39 Value of the minimum wage, 1960–2011

	Minimum wage	
	Current dollars	2011 dollars
1960	$1.00	$6.65
1967	1.40	8.25
1973	1.60	7.24
1979	2.90	8.38
1989	3.35	5.87
1990	3.80	6.34
1991	4.25	6.85
1996	4.75	6.78
1997	5.15	7.20
2000	5.15	6.73
2007	5.85	6.35
2008	6.55	6.84
2009	7.25	7.60
2011	7.25	7.25
Period averages		
1960s	$1.29	$7.91
1970s	2.07	8.02
1980s	3.33	6.92
1990s	4.53	6.70
2000s	5.57	6.46
Percent change		
1979–1989		-29.9%
1989–2000		14.6
2000–2011		7.8
1967–2011		-12.1

Source: Authors' analysis of U.S. Department of Labor Wage and Hour Division (2009)

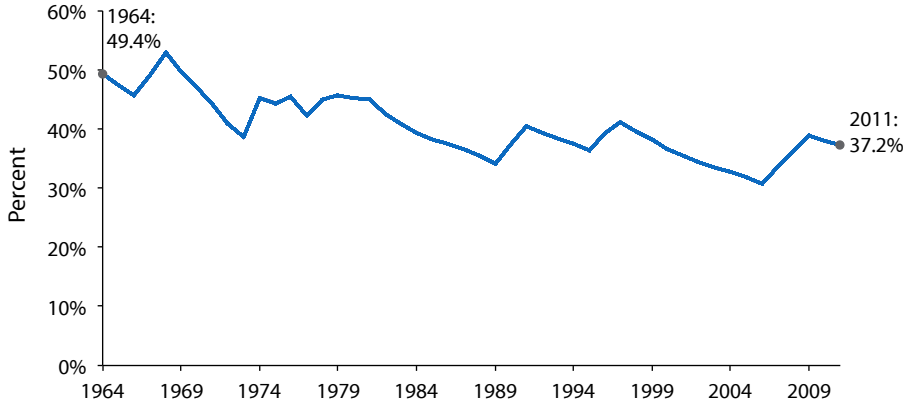
It has been argued that the minimum wage primarily affects teenagers and others with no family responsibilities. To address this claim, **Table 4.40** examines the demographic composition of the workforce that would benefit from an increase in the minimum wage in 2014 to $9.80, about 47 percent of the average wage. This analysis takes into account the many workers benefiting from a state minimum wage higher than the current federal level (discussed further below).

Figure 4AD Real value of the minimum wage, 1960–2011



Source: Authors' analysis of U.S. Department of Labor Wage and Hour Division (2009)

Figure 4AE Minimum wage as a share of average hourly earnings, 1964–2011



Note: Earnings measured is average hourly earnings of production/nonsupervisory workers.

Source: Authors' analysis of U.S. Department of Labor Wage and Hour Division (2009) and Bureau of Labor Statistics Current Employment Statistics

Assessing who would benefit sheds light on who has been affected by the long-term drop in the real value of the minimum wage.

An analysis of only those earning between the current and the proposed new minimum wage would be too narrow, since a higher minimum wage would

Table 4.40 Characteristics of workers affected by proposed minimum-wage increase to $9.80 in 2014

	Directly	Indirectly*	Total	Total workforce
Total (millions)	19.5	8.9	28.4	127.4
Share of workforce	15.3%	7.0%	22.3%	100.0%
Gender				
Female	56.1%	51.1%	54.5%	48.3%
Male	43.9	48.9	45.5	51.7
Work hours				
Part time (<20 hrs/week)	17.1%	10.4%	15.0%	5.9%
Mid time (20–34 hrs/week)	33.9	24.4	30.9	14.5
Full time (35+ hrs/week)	49.1	65.2	54.1	79.6
Family status				
Married parent	15.9%	21.5%	17.6%	27.2%
Single parent	10.5	10.1	10.4	7.5
Age				
Age 20+	84.7%	95.0%	87.9%	96.6%
Under 20	15.3	5.0	12.1	3.4
Race/ethnicity				
White	56.2%	55.9%	56.1%	67.4%
African American	14.1	14.5	14.2	10.9
Hispanic	23.9	23.0	23.6	15.0
Asian	5.8	6.6	6.1	6.8
Industry				
Retail trade	24.5%	17.3%	22.2%	11.7%
Leisure and hospitality	23.4	14.3	20.6	9.4
Other	52.1	68.3	57.2	78.8
Occupation				
Sales	21.0%	12.5%	18.3%	10.5%
Service	37.7	31.3	35.7	18.0
Other	41.3	56.2	46.0	71.5

* Indirectly affected workers currently have a wage rate between $9.80 (the proposed minimum wage) and $12.35 (the proposed minimum wage plus the $2.55 increase from the current minimum wage of $7.25). They would receive a raise as employer pay scales adjust upward to reflect the new minimum wage.

Source: Cooper (2012) analysis of Current Population Survey Outgoing Rotation Group microdata

affect workers who earn more than but close to the proposed new minimum; they would receive increases if the minimum wage rises. For these reasons, Table 4.40 also includes other low-wage workers who would gain from the "spillover effect"

of a higher minimum wage. The table presents information on these workers in the column labeled "Indirectly," a group totaling 8.9 million workers, or 7.0 percent of the workforce. The increase would affect 19.5 million workers directly, or 15.3 percent of the workforce. In total, the change in the minimum wage to $9.80 would affect a substantial group, 28.4 million workers, or 22.3 percent of the workforce. By this metric over a fifth of the workforce has been affected by the eroded value of the minimum wage.

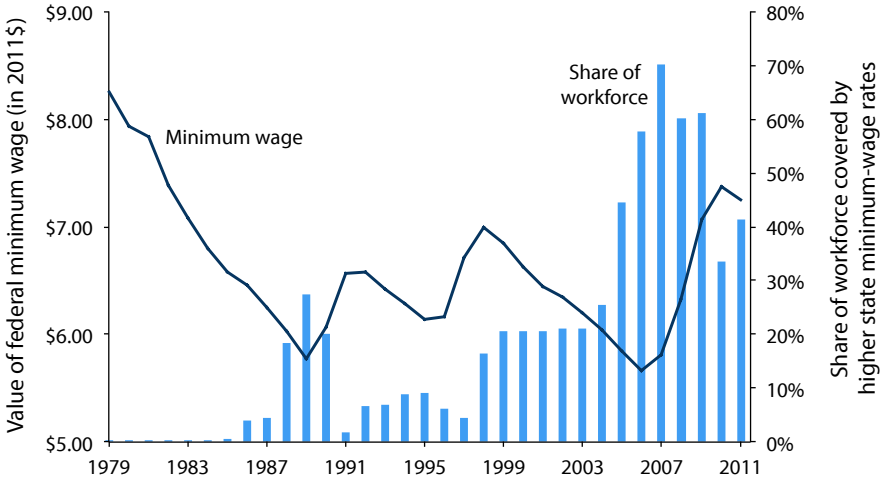
A higher minimum wage would disproportionately affect women: They constitute a majority (54.5 percent) of those who would benefit, greater than their 48.3 percent share of the workforce. The vast majority (87.9 percent) of those who would be affected by the higher minimum wage are age 20 or over; thus, it is clear the increase would not mainly benefit teenagers. Similarly, single parents would disproportionately benefit from a higher minimum wage: 10.4 percent of those who would be affected are single parents, higher than their 7.5 percent share of the workforce. In addition, many beneficiaries (17.6 percent of the total) of the proposed minimum-wage increase are parents in a married-couple family; this share is less than their 27.2 percent share of the workforce. While minorities are disproportionately represented among the potential beneficiaries (23.6 and 14.2 percent are, respectively, Hispanic and African American), the majority, 56.1 percent, are white. A majority (54.1 percent) also work full time (at least 35 hours weekly), and another 30.9 percent work at least 20 hours but less than 35 hours each week.

Table 4.40 also shows that the beneficiaries of a potential minimum-wage increase are disproportionately concentrated in the retail and hospitality industries (42.8 percent are employed there, compared with just 21.1 percent of all workers), while other industries are underrepresented among this group. The demographic breakdown of those affected by the spillover effects of the proposed increase—those indirectly affected—is more inclusive of full-time and adult workers but has a similar racial/ethnic breakdown as the group directly affected.

The impact of the recent and proposed increases in the federal minimum wage is diminished somewhat compared with that of earlier increases because a substantial number of states have raised their own minimum-wage levels in recent years, reducing the number of workers affected by any proposed federal change. **Figure 4AF** contrasts the real value of the federal minimum wage with the share of the workforce covered by legislated state minimum wages that exceed the federal level. In 2007 31 states that were home to 70 percent of the nation's workforce had a minimum wage exceeding the federal level. By 2011 the number had declined to 17 states and about 41 percent of the workforce.

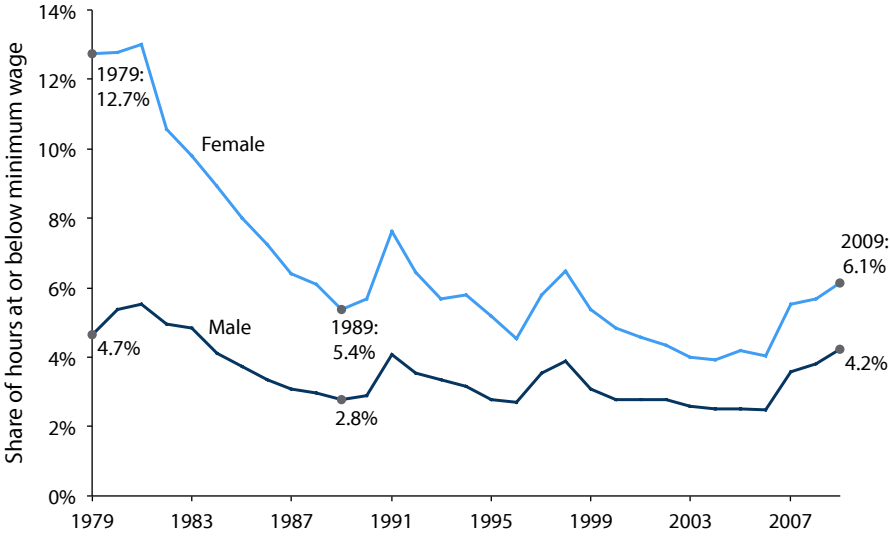
Another way to assess the importance of the minimum wage is to measure the share of total hours worked by workers earning at or below (some workers are not covered by minimum-wage laws) the legislated minimum (both federal and

Figure 4AF Real value of the federal minimum wage and share of workforce covered by higher state minimums, 1979–2011



Source: Authors' analysis of U.S. Department of Labor (2009) and Cooper (2012) update of Shierholz (2009)

Figure 4AG Share of worker hours paid at or below the minimum wage, by gender, 1979–2009



Source: Authors' analysis of Autor, Manning, and Smith (2010)

state). **Figure 4AG** illustrates that the minimum wage has been more important in setting a floor for women than for men and that there was a substantial erosion of the importance of the minimum wage for women in the 1980s. Since then the share of hours worked at or below the minimum wage has remained fairly low, except for a slight trend upward in the mid-2000s. It is notable that the 50/10 wage gap among women grew tremendously (as the 10th-percentile wage fell) in the 1980s, at the same time as the share of total hours worked by women workers earning at or below the legislated minimum fell.

Table 4.41 shows the impact of the minimum wage (including spillover impacts affecting workers just above the minimum) on the 50/10 wage gap among women, men, and overall in the years 1979–1991, when the value of the minimum wage eroded significantly, and over the longer period from 1979 to 2009. The results in Table 4.41 confirm that the deterioration in the minimum wage's value had a much larger impact on wages of women than of men. Between 1979 and 2009 the erosion of the minimum wage explained about two-thirds (65.5 percent) of the large 25.2 (log percentage point) expansion of the 50/10 wage gap among women but just over a tenth (11.3 percent) of the smaller 5.3 expansion of the 50/10 wage gap among men. For workers overall more than half (57.0 percent) of the increase in the 50/10 wage gap from 1979 to 2009 was accounted for by the erosion of the minimum wage. Curiously, the impact of the minimum wage on the 50/10 wage gap was less from 1979 to 1991 than from 1979 to 2009 even though the major decline of the value of the minimum wage occurred in the

Table 4.41 Minimum-wage impact on 50/10 wage gap, 1979–2009

	Change in 50/10 wage gap*		
	Actual change	Minimum-wage effect	Change explained by minimum wage
1979–1991			
Women	22.4	7.3	32.6%
Men	11.2	0.8	7.1
All	7.1	3.0	42.3
1979–2009			
Women	25.2	16.5	65.5%
Men	5.3	0.6	11.3
All	11.4	6.5	57.0

* Change in the (log) gap between wages of workers at the 50th percentile relative to wages of those at the 10th percentile

Source: Authors' analysis of Autor, Manning, and Smith (2010, Table 5)

1980s. Still, about a third of the 50/10 wage gap expansion among women from 1979 to 1991 can be explained by the falling value of the minimum wage.

The level of the minimum wage strongly affects the wage gains of low-wage workers, particularly low-wage women whose wages over the last few decades have essentially been set by the legislated minimum. Thus, the erosion of the minimum wage's value (along with high unemployment) led to a precipitous drop in the wages of low-wage women in the 1980s and to a large increase in the 50/10 wage gap. Wages among low-wage women (i.e., at the 10th percentile) stabilized in the late 1980s after these wages had descended close to their lowest possible level (i.e., near the minimum wage, where employers could still possibly hire) and as unemployment dropped. Thereafter, the 50/10 gap was flat or declined as unemployment fell to low levels in the late 1990s and as the federal government implemented two sets of increases in the minimum wage in the 1990s. Between 1999 and 2006, as the real value of the minimum wage eroded and unemployment rose, wage growth of low-wage women once again weakened, and the 50/10 wage gap grew. The legislated increases in the federal minimum wage that took effect in 2007, 2008, and 2009 kept the 50/10 wage gap among women from rising despite higher unemployment.

Executive and finance-sector pay

One distinct aspect of growing wage inequality is the gap between the very highest earners—those in the upper 1.0 percent or even upper 0.1 percent—and other high-wage earners, such as those at the 90th percentile (who earn more than 90 percent of all workers). These wage trends were reviewed in an earlier section. This section explores two key drivers of the wage increases in this top tier of wage earners: executive compensation and the increased size and high pay of the financial sector.

Our analysis first examines the role of executives and the financial sector in the growth of incomes of the top 1.0 and top 0.1 percent, and it then examines the growth of CEO compensation back to 1965, including the growth of the CEO-to-worker compensation ratio.

Table 4.42 draws on a study of tax returns to show the trend in the shares of total income (which includes wages and other types of income) of U.S. households accruing to the top 1.0 and top 0.1 percent of households. It further breaks down these two top income groups into households headed by either an "executive" (a group including managers and supervisors and hereafter referred to as executives) in a nonfinancial sector or by someone (executive or otherwise) working in the financial sector. (In Panel A, the household head is defined as the "primary taxpayer.")

Between 1979 and 2005 (the latest data available with these breakdowns) the share of total income held by the top 1.0 percent more than doubled, from 9.7 percent to 21.0 percent, with most of the increase occurring since 1993. The top

Table 4.42 Role of executives and financial sector in income growth of top 1.0% and top 0.1%, 1979–2005

	Share of total income*					1979–2005	
	1979	1993	1999	2001	2005	Change	Share
A. By rank and occupation of primary taxpayer							
Top 1.0%	9.7%	14.0%	19.3%	17.5%	21.0%	11.2	100%
Executives, managers, and supervisors (nonfinance)	3.8	5.6	7.8	6.5	7.9	4.0	36%
Finance workers, including executives	0.9	1.8	3.1	3.0	3.4	2.5	23%
Total, executives and finance workers	**4.8**	**7.4**	**10.9**	**9.4**	**11.3**	**6.5**	**58%**
Top 0.1%	3.3%	5.5%	9.3%	7.9%	10.3%	7.0	100%
Executives, managers, and supervisors (nonfinance)	1.6	2.8	4.5	3.5	4.7	3.1	44%
Finance workers, including executives	0.4	0.9	1.8	1.7	2.1	1.6	23%
Total, executives and finance workers	**2.0**	**3.7**	**6.3**	**5.2**	**6.7**	**4.7**	**67%**
B. Share of households with working spouse employed as executive or in finance							
Top 1.0%	10.0%	14.2%	16.1%	15.9%	15.7%	5.7	n/a
Top 0.1%	11.6	15.3	16.0	15.0	15.5	3.9	n/a

* Household income including capital gains

Source: Authors' analysis of Bakija, Cole, and Heim (2012, Tables 4, 5, 6a, and 7a)

0.1 percent led the way by more than tripling its income share, from 3.3 percent to 10.3 percent. This 7.0 percentage-point gain in income share of the top 0.1 percent accounted for more than 60 percent of the overall 11.2 percentage-point rise in the income share of the entire top 1.0 percent.

The table establishes that increases in income at the top were largely driven by households headed by someone who was either a nonfinance executive or in the financial sector as an executive or in some other capacity. Households headed by a nonfinance executive were associated with 44 percent of the growth of the top 0.1 percent's income share and 36 percent of the growth among the top 1.0 percent. Those in the financial sector were associated with nearly a fourth (23 percent) of the expansion of the income shares of both the top 1.0 and top 0.1 percent.

Together, finance workers and executives accounted for 58 percent of the expansion of income for the top 1.0 percent of households and two-thirds (67 percent) of the income growth of the top 0.1 percent of households.

This estimate of the impact of executives and finance on the growing incomes at the top does not include the role of earnings from spouses. These top-tier-income households frequently have employed spouses (though the data show the share of these households with an employed spouse did not grow between 1993 and 2005, the earliest and latest years for which data are available), and these spouses have increasingly been executives or employed in the financial sector. As the bottom section of Table 4.42 shows, the share of households with an employed spouse who was an executive or in finance, relative to all top 1.0 and top 0.1 percent households with or without spouses present, grew from 1979 to 1993 and held steady at roughly 15 percent thereafter. It is not possible to determine the role of these spouses in driving up top incomes without knowing whether the households' primary taxpayers were also executives or in finance, and these data are not available. However, the increased incomes earned by these spouses and their expanded role means that our analysis of the occupations of the "primary taxpayer" understates the total role of executives and the finance sector in driving up top incomes.

The 1980s, 1990s, and 2000s have been prosperous times for top U.S. executives, especially relative to other wage earners. The enormous pay increases received by chief executive officers of large firms have spillover effects (the pay of other executives and managers rises in tandem with CEO pay), but unfortunately no studies have established the scale of this impact.

Table 4.43 uses two measures of compensation to show trends in CEO pay since 1965. The measures differ only in their treatment of stock options: One incorporates stock options according to how much CEOs realized in that particular year (by exercising stock options available), and the other incorporates the value (the Black Scholes value) of stock options granted that year. Besides stock options, each measure includes the sum of salaries, bonuses, restricted stock grants, and long-term incentive payouts. It is possible to have broader measures of CEO compensation, but these would not be available for a historical series. The only historical CEO compensation data available (for 1965 to 1992) incorporate the value of stock options realized, and we use this series to extend the two measures back to 1965 (which explains why the growth from 1965 to 1978 is the same for both measures).

CEO compensation in Table 4.43 is the average of the annual compensation of the CEOs in the 350 publicly owned firms (i.e., they sell stock on the open market) with the largest revenue each year. For comparison, the table also presents the annual compensation of a private-sector production/nonsupervisory worker (a category that covers more than 80 percent of payroll employment), which allows us to compare CEO compensation to that of a "typical" private-sector worker.

Table 4.43 CEO compensation and CEO-to-worker compensation ratio, 1965–2011 (2011 dollars)

	CEO annual compensation (thousands)*		Worker annual compensation (thousands)		Stock market indices (inflation-adjusted)		CEO-to-worker compensation ratio***	
	Options realized	Options granted	Private-sector	Firms' industry**	S&P 500	Dow Jones	Options realized	Options granted
1965	$791	$750	$38	n/a	511	5,278	20.1	18.3
1973	1,033	980	45.8	n/a	451	3,881	22.1	20.1
1978	1,413	1,341	47.6	n/a	282	2,411	29.0	26.5
1989	2,631	2,496	44.0	n/a	525	4,081	58.5	53.3
1995	5,570	6,177	43.6	49.8	737	6,120	122.6	136.8
2000	19,482	19,977	45.9	52.0	1,730	13,006	383.4	411.3
2007	17,919	12,484	48.2	52.2	1,487	13,268	351.7	244.1
2008	17,491	11,648	48.4	53.0	1,183	10,902	314.9	225.7
2009	10,036	9,639	50.5	55.4	923	8,648	193.1	181.5
2010	12,042	11,003	50.9	56.0	1,092	10,215	228.0	205.9
2011	12,141	11,082	50.3	55.4	1,268	11,958	231.0	209.4
Percent change							**Change in ratio**	
1978–2011	759.3%	726.7%	5.7%	n/a	349.1%	395.9%	202.0	182.9
1965–1978	78.7	78.7	23.7	n/a	-44.7	-54.3	8.9	8.1
1978–2000	1,278.8	1,390.3	-3.6	n/a	513.0	439.3	354.4	384.9
2000–2011	-37.7	-44.5	9.7	6.6%	-26.7	-8.1	-152.4	-201.9

* "Options realized" compensation series includes salaries, bonuses, restricted stock grants, options exercised, and long-term incentive payouts for CEOs at the top 350 firms ranked by sales. "Options granted" compensation series includes salaries, bonuses, restricted stock grants, options granted, and long-term incentive payouts for CEOs at the top 350 firms ranked by sales.

** Annual compensation of production and nonsupervisory workers in the key industry of the firms in the sample

*** Based on averaging specific firm CEO-to-worker compensation ratios and not the ratio of averages of CEO and worker compensation

Source: Authors' analysis of data from Compustat ExecuComp database, Federal Reserve Economic Data (Stock Market Indexes), Bureau of Labor Statistics Current Employment Statistics, and Bureau of Economic Analysis National Income and Product Accounts

Last, from 1995 onward we can identify the average annual compensation of the production/nonsupervisory workers in the key industry of the firms included in the sample. We take this compensation as a more refined proxy for the pay of a "typical" worker in these particular firms. The pre-1995 historical benchmark years used in this analysis are the years for which data are available.

CEO compensation grew 78.7 percent between 1965 and 1978, about three times the growth of the compensation of private-sector workers. It is interesting that the stock market (as measured by the Dow Jones and S&P indices) fell by about half at the same time that CEO compensation grew by 78.7 percent. CEO compensation grew strongly over the 1980s but exploded in the 1990s; it peaked in 2000 at more than $19 million, a growth from 1978 to 2000 of about 1,279 or 1,390 percent, respectively, by the options-realized and the options-granted measures. This growth in CEO compensation far exceeded even the substantial rise in the stock markets, which grew in value by about 439 percent (Dow) and 513 percent (S&P) over the 1980s and 1990s. In stark contrast to both the stock market and CEO compensation growth was the 3.6 percent decline in the compensation of private-sector workers over the same period.

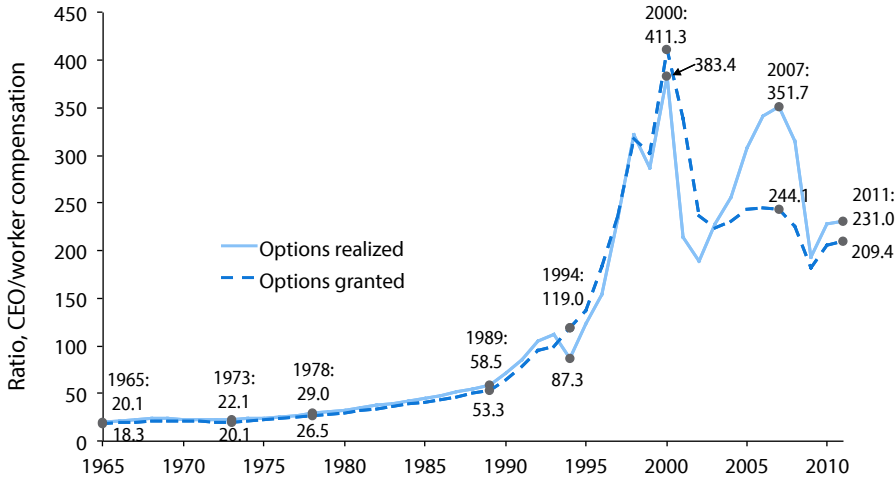
The fall in the stock market in the early 2000s led to a substantial paring back of CEO compensation, but by 2007 (when the stock market had mostly recovered) CEO compensation had returned close to its 2000 level, at least for the options-realized measure. The financial crisis in 2008 and the accompanying stock market tumble knocked CEO compensation down again. By 2011 the stock market had recouped much of the ground lost in the 2008 financial crisis, and CEO compensation had returned to either about $11.1 million measured by options granted or $12.1 million measured by options realized. Between 2010 and 2011 CEO compensation grew about 1 percent while the compensation of production and nonsupervisory workers fell by about 1 percent.

CEO compensation in 2011 is high by any metric, except when compared with its own peak in 2000, after the 1990s stock bubble. From 1978 to 2011, CEO compensation grew more than 725 percent, substantially more than the stock market and remarkably more than worker compensation, which grew by a meager 5.7 percent.

Table 4.43 also presents the trend in the ratio of CEO-to-worker compensation to illustrate the increased divergence between CEO pay and a typical worker's pay over time. This overall ratio is computed in two steps. The first step is to compute, for each of the largest 350 firms, the ratio of the CEO's compensation to the annual compensation of workers in the key industry of the firm (data on the pay of workers in any particular firm are not available). The second step is to average that ratio across all the firms. The data in the last two columns are the resulting ratios in specific years. The trends prior to 1992 are based on the changes in average CEO and private-sector worker compensation. The year-by-year trends are presented in **Figure 4AH**.

Depending on the CEO compensation measure, U.S. CEOs in major companies earned 18.3 or 20.1 times more than a typical worker in 1965; this ratio grew to 29.0-to-1 or 26.5-to-1 in 1978 and to 58.5-to-1 or 53.3-to-1 by 1989, and then it surged in the 1990s to hit 383.4-to-1 or 411.3-to-1 by 2000. The fall in the stock

Figure 4AH CEO-to-worker compensation ratio (options granted and options realized), 1965–2011



Note: "Options granted" compensation series data include salaries, bonuses, restricted stock grants, options granted, and long-term incentive payouts for CEOs at the top 350 U.S. firms ranked by sales. "Options realized" compensation series data include salaries, bonuses, restricted stock grants, options exercised, and long-term incentive payouts for CEOs at the top 350 firms ranked by sales.

Source: Authors' analysis of data from Compustat ExecuComp database, Bureau of Labor Statistics Current Employment Statistics, and Bureau of Economic Analysis National Income and Product Accounts

market after 2000 reduced CEO stock-related pay (e.g., options) and caused CEO compensation to tumble until 2002 and 2003. CEO compensation recovered to a level of 351.7 times typical-worker compensation by 2007, almost back to its 2000 level using the options-realized metric. Compensation based on options granted, however, returned only to 244.1-to-1 in 2007, still far below its heights in 2000.

The financial crisis in 2008 and accompanying stock market decline reduced CEO compensation after 2007–2008, as discussed previously, and the CEO-to-worker compensation ratio fell in tandem. By 2011 the stock market had recouped much of the value it lost following the financial crisis. Likewise, CEO compensation had grown from its 2009 low, and the CEO-to-worker compensation ratio had recovered to either 231.0-to-1 or 209.4-to-1, depending on the measure of options.

Though lower than in some other years in the last decade, the CEO-to-worker compensation ratio in 2011 (231.0-to-1 or 209.4-to-1) was far above the ratio in 1989 (58.5-to-1 or 53.3-to-1), 1978 (29.0-to-1 or 26.5-to-1), or 1965 (20.1-to-1 or 18.3-to-1). This illustrates that CEOs have fared far better than the typical worker, the stock market, or the U.S. economy over the last several decades.

Explaining wage inequality: Bringing the factors together

The approach to understanding growing wage inequality in this chapter has been to examine the factors behind the growth of the three key wage gaps (those between the very top and top, the top and middle, and the middle and the bottom) rather than to consider wage inequality as a unitary phenomenon. This is because the different parts of the wage structure have diverged at differing paces and at differing times as a result of various factors.

The wage gap at the bottom, the 50/10 gap, which captures the difference between wages of workers at the 50th percentile, or median, and those at the 10th percentile in the wage distribution, expanded from 1979 to the late 1980s (1986 for men, 1988 for women), grew much more for women than for men, and has been stable since then. It is not difficult to explain these trends. Rapid inflation and failure to raise the minimum wage lowered the real value of the minimum wage by roughly 30 percent from 1979 to 1989 (Table 4.39) and undercut the wages of low-wage women, as far fewer were protected by this wage floor (Figure 4AG). Roughly two-thirds of the growth of the 50/10 wage gap for women from 1979 to 2009 can be explained by minimum-wage trends (Table 4.41). The substantial unemployment of the early 1980s drove the 50/10 wage gap for men, which only stopped expanding after the unemployment rate reached 6.2 percent in 1987, down from a peak of 10.8 percent in late 1982. Unemployment also put significant downward pressure on the wages of low-wage women.

The growth of the wage gap at the very top, between those in the top 1.0 percent (or higher) and other high-wage earners, is primarily the result of two factors: the superlative growth of compensation of CEOs and other top managers (Table 4.43), and the increasingly high salaries in the financial sector and the expansion of finance (Table 4.42) the latter of which we could label "financialization." Together, these two factors accounted for at least 58 percent of the growth of the income share of the top 1.0 percent of households and 67 percent—two-thirds—of the increased income share of the top 0.1 percent of households from 1979 to 2005 (Table 4.42). It should be noted that the growth of the stock market greatly affects the wage trends at the very top because stock options that are exercised are counted as wage income.

The decades-long expansion of the wage gap within the top half of the wage structure, such as the growth of the 95/50 wage gap, also has identifiable causes. It is partly explained by the ongoing erosion of unionization and the declining bargaining power of unions along with the weakened ability of unions to set norms or labor standards that raise the wages of comparable nonunion workers. The decline of unions has affected middle-wage men more than any other group and explains about three-fourths of the expanded wage gap between white- and blue-collar men and over a fifth of the expanded wage gap between high school– and college-educated men from 1978 to 2011 (Table 4.36). An expanded analysis that includes the

direct and norm-setting impact of unions shows that deunionization can explain about a third of the entire growth of wage inequality among men and around a fifth of the growth among women from 1973 to 2007 (Table 4.38).

International trade has been another factor suppressing wages in the middle of the wage structure, particularly since 1995. The college/noncollege wage gap grew modestly since 1995, rising 4.8 (log) percentage points, but this increase can almost totally be attributed to downward pressure exerted by trade on the wages of non-college-educated workers (Table 4.29). The emergence of high trade deficits and the import surge in the early 1980s also put substantial pressure on mid-level wages. This trade impact reinforced the pressure on low and mid-level wages exerted by the high unemployment of the early and mid-1980s. In addition, offshoring is now expanding the impact of globalization to higher-wage, white-collar workers. The shrinking share of employment in manufacturing and other high-paying sectors also reinforced the downward pressure on mid-level wages, an impact that was greatest in the 1980s, when it lowered hourly compensation 0.3 percent each year (Table 4.25).

Other factors not considered above have also put downward pressure on mid-level wages. Various industries were deregulated starting in the late 1970s, and in each of these industries—including airlines, trucking, interstate busing, telecommunications, utilities, and railroads—there was a strong adverse impact on the wages and compensation of blue-collar and other workers. Ongoing efforts to privatize public-sector functions have also put downward pressure on wages. Weakened labor standards (e.g., regarding overtime pay and independent contractor status) and generally weaker enforcement of labor standards also contribute to lower wages in the broad middle of the wage structure. At the same time, a weaker safety net, including the changes to what used to be called "welfare," empower employers because workers have fewer alternatives to less-than-desirable job conditions. Additionally, immigration policy in the form of temporary worker programs undercuts the wages of workers in such disparate fields as landscaping and hospitality, at the low end, to software engineering and computer programming, at the high end.

Rather than a disconnected list, these factors driving greater wage inequality are unified in a fundamental way: They are all the result of laissez-faire policies that strengthen the hands of employers and undercut the ability of low- and middle-wage workers to have good jobs and economic security. These laissez-faire policies (e.g., globalization, deregulation, weaker unions, and lower labor standards such as a weaker minimum wage) have all been portrayed to the public as providing goods and services at more competitive prices. Whatever the impact on prices, these policies have lowered the earning power of low- and middle-wage workers such that their real wages severely lag both productivity growth and wage growth of higher-wage workers. Further, monetary policies that aim to control

inflation by tolerating (or causing) higher-than-necessary levels of unemployment have added to the forces disempowering the vast majority of workers and generating continuously greater wage gaps between those at the top and all other workers. These factors behind growing wage inequality can also be seen as the dynamics generating the erosion of labor's share of income.

Technology and skill mismatches

Some observers argue that wage inequality is the result of the failure of workforce skills to keep pace with the education and skills that workplace technologies demand. This is what is meant when increasing wage inequality and income inequality are attributed to a growing "education divide" fueled by an increasing mismatch between the education and skills of the workforce and the education and skills needed to fill available jobs. This education gap is sometimes described as a wage gap between "those with more and those with less education," and is sometimes referred to as "higher returns to education and skills." All of these labels are manifestations of a "technology story" of wage inequality. According to this story, technological change has raised the education and skill requirements of jobs while the workforce "supply" of those skills and education levels has lagged, forcing employers to bid up the wages of those with the requisite skills and education, thereby widening the education and skill wage gaps that fuel growing wage and income inequality.

A particularly prevalent storyline is that technology is generating a much greater need for college-educated workers, which leads to a much larger wage gap between workers with and without a college degree.

Technological change can affect the wage structure by displacing some types of workers and increasing demand for others. Unfortunately, because it is difficult to measure the extent and overall character of technological change (i.e., whether and how much change alters the worker skill levels needed), it is difficult to identify the role of technological change in recent wage trends. In fact, more than a few analysts have simply assumed that whatever portion of wage inequality is unexplained by more easily measured factors (such as trade, unionization, and so on) is the consequence of technological change. But this is the type of analysis said to simply "put a name to our ignorance."

This section examines whether technological change and growing skill mismatches (or skill shortages), including a growing unmet demand for college graduates, can explain the growth of the various dimensions of wage inequality described earlier in this chapter. Technological change has played a role in rising demand for education and skills in the last few decades, but not more so than in prior decades. Furthermore, the rapid expansion of workforce education and skill levels has been sufficient to satisfy the increased demand. The conclusion, then, is that technological change, skill mismatches, skill shortages, and the "education

gap" have had very little to do with the growth of wage inequality. Rather, growing supply accompanied growing demand and, therefore, increasing wage gaps were the result of other factors. It is especially hard to attribute any of the growth of wage inequality since the mid-1990s to skill shortages or the education divide, as wage inequality rose rapidly but education-based wage gaps grew very modestly, and whatever growth in education wage gaps occurred was not necessarily due to technological change or skill shortages. Labor market trends among college graduates confirm this conclusion. Since 2002/2003, real wage growth among college graduates, including those in business and professional fields, has been disappointing, as has the erosion of employer-provided health and pension coverage. In addition, since 2000, more college graduates are working in jobs that do not require a college degree. Negative trends in wages, benefits, and job quality have been more extreme among younger college graduates, those considered best-equipped to fulfill demand for new technological skills.

What is the appeal of the technology story?

We are often told that the pace of change in the workplace is accelerating, and technological advances in communications, entertainment, Internet, and other technologies are widely visible. Thus it is not surprising that many people believe that technology is transforming the wage structure. But technological advances in consumer products do not in and of themselves change labor market outcomes. Rather, changes in the way goods and services are produced influence relative demand for different types of workers, and it is *this* that affects wage trends. Since many high-tech products are made with low-tech methods, there is no close correspondence between advanced consumer products and an increased need for skilled workers. Similarly, ordering a book online rather than at a bookstore may change the type of jobs in an industry—we might have fewer retail workers in bookselling and more truckers and warehouse workers—but it does not necessarily change the skill mix.

It is also easy to see why some economists would assume a large role for technology in growing wage inequality. First, growing wage inequality and the shift to more-educated workers have been caused more by shifts within industries than by shifts across industries (i.e., more service jobs, fewer manufacturing jobs). Second, according to research, technological change has traditionally been associated with increased demand for "more-educated" or "skilled" workers. As this chapter has documented, the wage premium for more-educated workers (i.e., college graduates) has risen over the last two decades, a pattern that to some analysts suggests an increase in what is called "skill-biased technological change" that is generating greater wage inequality.

Third, wages have risen the most for groups whose supply expanded the fastest (e.g., college graduates). Many economists reason that those fast-expanding

groups would have seen their wages depressed relative to other groups unless there were other factors working strongly in their favor, such as rapid expansion in demand. Rapid technological change favoring more-educated groups seems a logical explanation for wages that increase at the same time as supply.

One complication in assessing any technology-related explanation is that technology's impact can vary in different periods, sometimes most adversely affecting the least-educated and sometimes hurting mid-level skilled workers. The challenge is to empirically trace how technology affects the demand for different types of skills in different periods.

Education gaps and wage inequality

Rising education wage gaps are the primary mechanism through which technology is said to increase wage inequality. The extent to which education wage gaps do not explain wage inequality is the extent to which the technology story of wage inequality is misdirected, at least in terms of the conventional story in the public discourse. Similarly, the extent to which technology does not explain education wage gaps is the extent to which the technology story falls short. According to our research, education wage gaps have had only a modest impact on overall wage inequality since 1995—and even when they have appeared to play a limited role, the greater education wage gaps have not been driven by technology.

Table 4.44 presents trends in wage gaps between key education and wage groups in order to assess how they correspond. The table shows change in the gaps from 1979 to 1995 and from 1995 to 2007, before the recession, and from 1995 to 2011, the most recent data. We use 1995 as the dividing year because it was about then that growth of education wage gaps flattened. The table shows that wage inequality in the top half of the distribution grew strongly from 1995 to 2011 and that this growth in inequality was largely not driven by education wage gaps. The table also shows that all of the education wage gaps grew far less between 1995 and 2011 than in 1979–1995. The wage gap between those with a high school education and those without a high school credential ("less than high school") rose modestly before 1995 and then stabilized. The wage gaps of those with a college degree or advanced degree relative to those with less education grew about a fourth as fast in the 1995–2011 period as in 1979–1995. For instance, the wage gap between those with at least a college degree relative to those without a college degree rose from 28.9 percent in 1979 to 46.1 percent in 1995, a rise of 1.08 percentage points a year. From 1995 to 2011, this wage gap grew 4.8 percentage points, or just 0.30 percentage points each year. Since these education wage gaps grew more slowly since 1995 and have made only a modest contribution to the various wage group wage gaps, it follows that the prima facie evidence for technology causing wage inequality is weak.

Table 4.44 Trends in education wage gaps, key wage group wage gaps, and relative supply of education, 1979–2011

	1979	1995	2007	2011	Average annual change 1979–1995	1995–2007	1995–2011
Education wage gaps*							
College/high school	23.5%	42.5%	46.4%	46.9%	1.19	0.33	0.28
Advanced degree/high school	32.4	62.3	66.6	69.6	1.87	0.35	0.46
College or more/ noncollege	28.9	46.1	49.2	50.9	1.08	0.26	0.30
High school/less than high school	21.0	27.4	26.0	27.6	0.40	-0.11	0.01
Wage group wage gaps*							
50/10 (hourly)	57.8%	69.4%	66.3%	67.7%	0.72	-0.25	-0.10
95/50 (hourly)	86.9	101.8	110.2	113.0	0.93	0.70	0.70
Top 1.0/90th–95th (annual)	122.4	164.1	187.2	175.5	2.61	1.92	0.71
Relative supply *(share of employment)*							
College only (1)	12.7%	17.3%	20.9%	21.9%	0.29	0.30	0.29
Advanced degree (2)	6.0	8.1	10.1	11.3	0.13	0.17	0.20
College or more (1 + 2)	18.6	25.4	31.0	33.2	0.42	0.46	0.49

* Log point gaps based on regression-adjusted models with human capital controls
** Change in unadjusted log point wage gaps

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata and Tables 4.4 and 4.8 in this chapter

Additionally the table reveals how various education wage gap patterns correspond to the growth of the three key wage group wage gaps: between wages at the middle (50th percentile) and the bottom (10th percentile), known as the "50/10 gap"; between high and middle earners (the "95/50 gap"); and between the very top and other high earners (the gap between the top 1.0 percent and those making between the 90th and 95th percentile wage).

The 50/10 wage gap grew strongly in the early period but not at all in the latter period, which somewhat corresponds to the pattern of the high school/less-than-high-school differential. This would mean that technological change did not disadvantage low-wage workers relative to middle-wage workers since the late 1980s, as the wage gap did not grow at all (as discussed earlier, the 50/10 wage gap has been largely flat since the late 1980s). One reason the high school/

less-than-high-school differential didn't grow is that the share of workers without a high school credential declined enormously over these decades, falling from 20.1 percent in 1979 to just 8.4 percent in 2011 (Table 4.14). This is a clear case of supply shrinkage (in particular, of those without high school credentials) adjusting to increased relative demand (a reduced relative need for such workers). That is, there was a declining need for those without a high school degree as technology-related skill requirements grew, which would have, other things equal, generated growth in the high school/less-than-high-school differential as "less than high school" wages dropped. However, the shrinkage in the number of those without a high school degree compensated for the flagging demand for such workers.

In contrast, the wage gaps in the top half grew strongly pre- and post-1995, though growth was not as fast after 1995. The 95/50 wage gap grew 75 percent as fast from 1995 to 2011 as in the earlier period, and far faster than the growth of corresponding education wage gaps (e.g., growing 0.70 percentage points each year compared with the 0.30 percentage-point annual growth in the college or more/noncollege wage gap). The wage gap between the top 1.0 percent and other high earners grew strongly from 1995 to 2007, though education wage gaps grew very modestly. The reduction in this wage gap from 2007 to 2011 is due to the impact of the financial crisis on stock values and stock options (as discussed previously) and had nothing to do with trends in education wage gaps. In short, in 1995–2011, there was strong growth in the 95/50 wage gap and in the gap between the top 1.0 percent and other high earners, with the gap at the very top growing even faster from 1995 to 2007. This growth in wage inequality at the top occurred when education wage gaps grew modestly, suggesting that the connection between education wage gaps and overall wage inequality since 1995 has been very weak.

Even when the growth of education wage gaps corresponds to the growth of key wage group wage gaps, as in the 1980s, this does not necessarily indicate that technological change is the cause of the education gaps; many other factors affect education wage gaps. Earlier sections have demonstrated that changes in labor market institutions such as the minimum wage and unionization are responsible for some of the rise in education/wage differentials, and trade with low-wage nations has also had a substantial impact. These various factors have increased education wage gaps by lowering the wages of the noncollege workforce instead of bidding up college wages as they would do if the technology story were true. For instance, there was strong growth in the 50/10 wage gap in the 1980s and a corresponding (but much weaker) increase in the wage gap between high school graduates and those with no high school credential. Analyses presented earlier pointed to the declining value of the minimum wage and the persistent high unemployment of that period as the factors driving this wage inequality at the bottom, factors that lowered the wages of low-wage workers.

Similarly, the ongoing erosion of the union impact on wages has fueled the growth of the college/high school wage gap among both men and women. According to Table 4.36, deunionization can explain about one-fifth of the growth in the male college/high school wage premium from 1978 to 2011 and a quarter of the growth from 1989 to 2011 (not shown in the table), even without taking into account any effect of deunionization on nonunion workers (which would substantially raise this estimate of the impact of deunionization). Lastly, trade with low-wage nations has eroded the wages of noncollege workers, especially since 1995. This factor alone can explain almost the total rise in the college/noncollege wage gap from 1995 to 2011. If so, then technological change probably had no effect on that education wage gap after 1995 since trade and other factors can explain any post-1995 growth in education wage gaps.

To summarize, an alleged technology-driven growth in education wage gaps provides a very unsatisfactory explanation of rising wage inequality because the growth in education wage gaps only partially corresponds to that of key wage gaps, especially since 1995, and because other factors besides technology can explain much of the growth of education wage gaps.

The slowdown in the growth of demand for college graduates

The previous section examined the conventional assumption that education wage gaps are fueled by technology-driven changes in relative demand for more-educated or skilled workers, and showed that the role of technology is at best vastly overstated, given the proven influence of other factors on education wage gaps. This section looks specifically at the claim of technology-driven change itself. Technological change certainly has generated the need for a more educated workforce, and the workforce has indeed become far more educated. The share of the workforce without a high school degree has fallen sharply, and many more workers have college degrees (33.2 percent of the workforce had a four-year college or advanced degree in 2011, up from 18.7 percent in 1979, according to Table 4.14). Investment and technological change generally are associated with the need for more workforce skill and education—but this was true for the entire 20th century, and it therefore does not explain why wage inequality began to grow three decades ago. A convincing technology story must show that the impact of technology accelerated *relative to earlier periods* in order to explain why wage inequality started to grow in the 1980s, 1990s, and 2000s, and did not grow in prior decades.

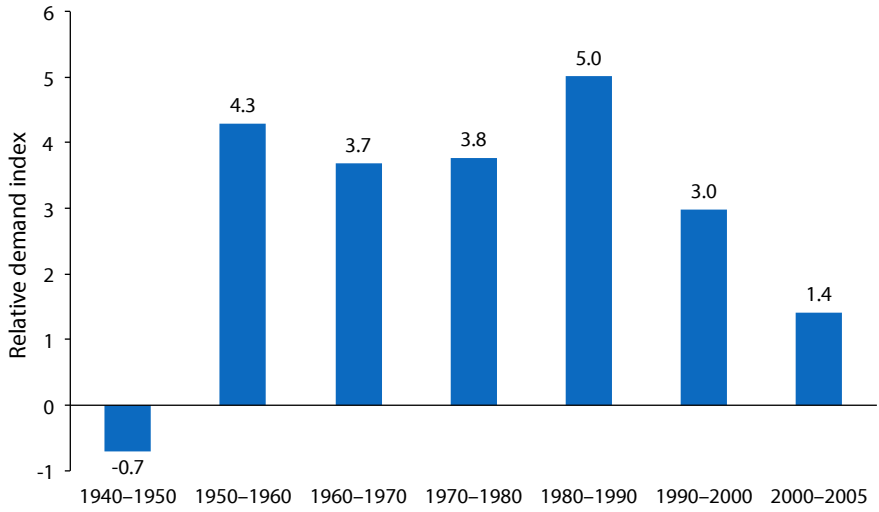
To assess whether the role of technological change accelerated, we examine trends in the relative demand for more-educated and skilled workers (as a proxy). In fact, what we find is that the growth in the relative demand for college graduates has been historically slow in the 1990s and 2000s.

Figure 4AI presents estimates of the growth of the relative demand for college graduates (defined in this research as those with a four-year degree or more and some of those with an education beyond high school) for periods from 1940 to 2005. These estimates of relative demand are deduced from underlying trends in supply and wages.

What does the pattern tell us? First, the relative demand for college graduates grew in each period, albeit more in some periods than in others (except during the special circumstances of World War II, when wages grew faster for noncollege workers). And as we know from Table 4.14 and other data, there was a simultaneous shift toward more college graduates throughout this period. Therefore, we can safely say that skill-biased technological change has been ongoing for some time, leading to employers' increasingly greater needs for college graduates (or "skilled" workers). However, since 1980, the growth rate of relative demand for college graduates was not faster than the growth rate of relative demand over the prior 30 years. Thus, given that wage inequality grew faster in recent decades than in earlier decades when technologically driven demands for college graduates were at least as rapid, it is hard to conclude that a more rapid rise in technological change drove up wage inequality since 1980.

In particular, trends since 1990 do not support the argument that a technologically driven demand for college-educated workers has increased their wages and therefore expanded wage inequalities. Note that the relative demand for

Figure 4AI Growth in relative demand for college graduates, 1940–2005



Source: Authors' analysis of Goldin and Katz (2008, Table 1)

college graduates grew more slowly in the 1990s than in any previous period since 1950 and that relative demand grew even more slowly from 2000 to 2005. This suggests that we are not in a time of historically rapid change in the need for education/skills in the workplace, at least if one equates a college degree with skilled labor. It also shows that the entire period since 1980 cannot be considered as one undifferentiated period of rapidly rising demand for college graduates.

The data comparing the 1979–1995 and 1995–2011 periods presented in Table 4.44 affirm the recent slowdown in relative demand for college graduates. The bottom panel shows the growth in relative supply of college graduates (college only, advanced degree, and both combined), which grew at roughly the same pace in each period (for college only) or a bit faster in the more recent period (for advanced degree and combined). As emphasized previously, the growth of the education wage gaps, most importantly the gap between those with at least a college degree and those with no college degree, slowed tremendously after 1995. The fact that the relative wage of college graduates grew more slowly while relative supply grew comparably across periods implies that the relative demand for college graduates slowed a great deal after 1995. This would be the case even with a slight uptick in supply growth (as in the combined group). Thus, these data affirm the findings of Figure 4AI.

The discussions in the last two sections show clear holes in the technology/education story. Only by ignoring factors such as institutional changes (the minimum wage, unionization, norms, etc.) and globalization (including immigration) that have also led to relatively higher wages for more-educated workers (primarily by depressing the wages of non-college-educated workers) can one accept the assumption that technology is the cause of all changes in education wage gaps. But if one accepts that assumption—and therefore accepts that increased relative demand for college graduates is a proxy for technological change—the slow relative demand for college graduates in recent years argues that technological change *decelerated*. It must have thus been a *weaker* force in generating wage inequality in recent years. Given that these other factors have been more important in the last few decades, it seems certain that technological change has played a smaller role in the last few decades, especially post-1995, than in the pre-1980 period.

Within-group wage inequality

As discussed previously, there are two dimensions of wage inequality—between-group wage differentials, such as those relating to different levels of education and experience, and within-group wage inequality that occurs among workers with similar education and experience. We have already seen that the key education wage gaps—an example of between-group wage differentials—do not readily support a technology story. The same is true for the growth of within-group inequality, which accounts for roughly 60 percent of the growth of overall wage inequality

since 1979 (see Table 4.20). The growing wage gaps among workers with similar education and experience are not easily related to technological change unless they are interpreted as a reflection of growing economic returns to worker skills (such as motivation, aptitude for math, etc.) that are not easily measured (that is, the data and methods used to estimate education differentials cannot identify these kinds of differentials).

However, there are no signs that the growth of within-group wage inequality is associated with technological change. First, it has not grown faster in those industries where the use of technology grew the most (i.e., where computerization or capital investment were more rapid). Second, the economic returns to measurable skills (e.g., education) and unmeasurable skills (e.g., motivation) do not grow in tandem, which they would seem to do if they were both technologically driven. In fact, between-group and within-group inequality have not moved together in the various subperiods since 1973.

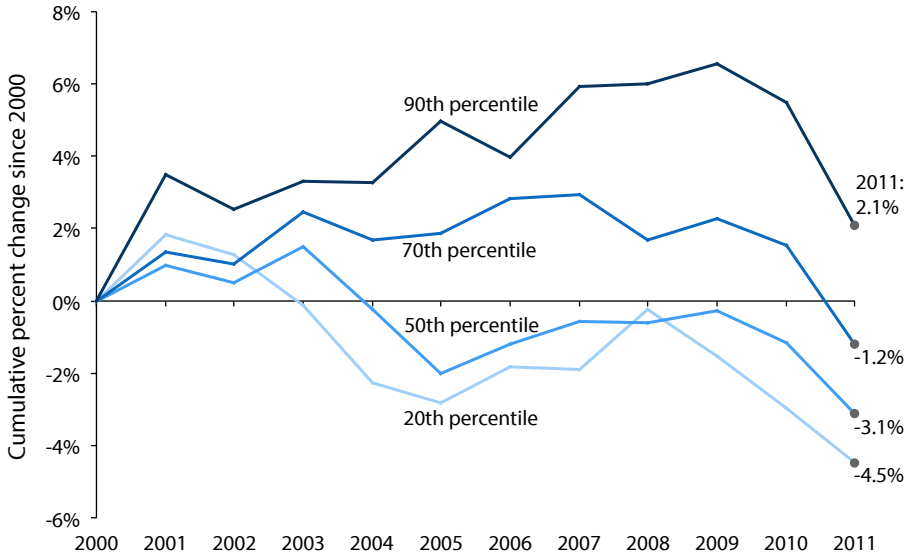
In addition, the timing of the growth of within-group wage inequality does not easily correspond to the technology story (see Table 4.20). For instance, consider what happened during the technology-led productivity boom of 1995–2000: Within-group wage inequality actually declined among women and was essentially flat among men. In contrast, within-group wage inequality grew rapidly in the low-productivity 1980s, faster even than after 2000 when productivity accelerated.

The labor market difficulties of college graduates

The veracity of the technology story rests heavily on the increasing relative wages of more-educated and skilled workers. However, while these workers have done better in *relative* terms, they have not fared well in *absolute* terms, especially in the last 10 years. As noted at the outset of the chapter there has been no net improvement in the real hourly wages and compensation of the average college graduate since 2003 (Figure 4A). Moreover, the wages of entry-level college graduates fell from 2000 to 2007 and from 2007 to 2011 (Table 4.18 and Figure 4Q). The failure of presumably the most technologically savvy college graduates, those of recent vintage, to see real wage gains runs counter to the technology story. The disappointing wage trends for college graduates are sometimes obscured in various analyses because of a focus on all college graduates (combining those with advanced degrees and those with terminal four-year degrees), and on relative, not absolute, wages. This section provides further evidence of the broad-scale wage and underemployment problems experienced by those with a college degree (but no further education) in the 2000s.

Real hourly wages have declined for roughly 70 percent of the college-educated workforce since 2000, as shown in **Figure 4AJ**, which presents the cumulative change in real wages of college graduates at the 20th, 50th, 70th, and 90th percentiles in wages. Perhaps more astonishing is that wages of college

Figure 4AJ Cumulative change in real hourly wages of college graduates, by decile, 2000–2011



Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

graduates at the 90th percentile were lower in 2011 than in 2002. Since 2000, the vast majority of college graduates have not been winners from technological change, or in general.

The poor wage performance among college graduates is also apparent in nearly every key occupational category, as shown in **Table 4.45**, which presents wage trends for the nine most important occupations for college graduates. As discussed at the outset of the chapter, there was strong real wage growth in the first few years of the 2000s resulting from the momentum of the late-1990s wage boom, so the wage trends for 2000–2011 are generally better than those for 2002–2011 or 2003–2011. Because the wage data are volatile, providing data for both 2002–2011 and 2003–2011 checks for the robustness of the results. Real wages of college graduates fell for every key occupational group from 2003 to 2011, except for computer and mathematical science. From 2002 to 2011 there were four occupational categories with positive real wage growth for college graduates; however, even the occupation with the best real wage growth—computer and mathematical science—had growth of 3.2 percent over those nine years, an increase of about a third of 1 percent a year. It is fair to say that there was no occupation providing college graduates on average with good real wage growth after 2002 or 2003.

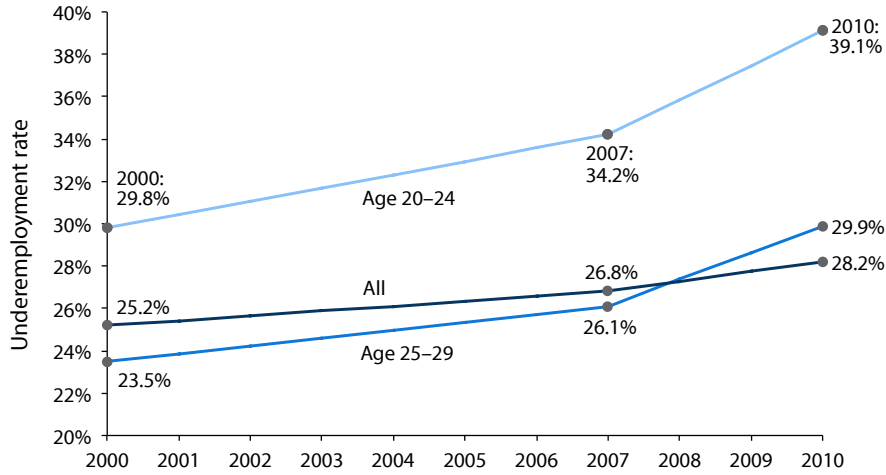
Table 4.45 Inflation-adjusted hourly wage trends of college graduates, by occupation, 2000–2011

Occupation	Share of all college graduates	Change		
		2000–2011	2002–2011	2003–2011
All college graduates	100.0%	0.2%	-2.2%	-1.9%
Management and business				
Management	17.6%	5.0%	-2.2%	-1.9%
Business and financial operations	9.2	0.3	0.7	-1.7
Professional and related				
Computer and mathematical science	5.4%	4.5%	3.2%	4.4%
Architecture and engineering	4.3	4.3	2.0	-0.6
Education, training, and library	10.6	1.7	-0.6	-2.2
Health care practitioner and technical	7.1	4.8	0.4	-1.1
Sales and office				
Sales and related	12.7%	-5.4%	-9.1%	-10.9%
Office and administrative support	9.9	-1.3	-4.6	-0.8
Production				
Transportation and material moving	4.5%	-10.0%	-12.1%	-6.8%
Subtotal of occupations shown	81.3%			

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

Lastly, many college graduates have been forced to work in occupations that do not require a college education, a phenomenon labeled "underemployment." One advantage of having a college degree is the ability to "bump down" and displace others with less education. Nevertheless, this rise in underemployed college graduates signals that there has not been a growing unmet demand for college graduates in jobs that require such educations. **Figure 4AK** shows the change in college underemployment for young college graduates and for all college graduates from 2000 to 2010. Underemployment rose among young college graduates and all college graduates from 2000 to 2007, both years of low unemployment. This indicates that rising underemployment reflects shifts in the quality of jobs available to college graduates and not the lack of job availability overall, as would

Figure 4AK Underemployment of college graduates, by age, 2000–2010



Note: Underemployment is defined as college graduates working in occupations that do not require a college degree to perform the work.

Source: Authors' analysis of Fogg and Harrington (2011, Table 1)

be the case in a recession. Unsurprisingly, the growth of underemployment among college graduates continued from 2007 to 2010.

It is difficult to see college graduates, at least those without any advanced degree, as winners in the labor market in the 2000s. College graduates do better than workers with less education, but their jobs have not provided real wage growth since 2002 or 2003. Furthermore, their jobs increasingly do not require a college degree and do not provide health or pension coverage (Tables 4.10 and 4.11). These patterns do not match the conventional technology story.

Jobs of the future

This section presents an analysis of the pay levels and education and skill requirements of the jobs projected by the Bureau of Labor Statistics to be created over the next 10 years. Some analysts examine which occupations are expected to grow at the fastest (and slowest) rates, while others examine which occupations will create the most (or least) absolute number of jobs. Our analysis assesses whether the types of jobs expected will significantly change wages earned or significantly raise the quality of work or the skill/education requirements needed to perform the work. This exercise requires an analysis of how the composition of jobs will

change, that is, which occupations will expand or contract their *share* of overall employment.

Table 4.46 presents such an analysis for the 749 occupations for which the Bureau of Labor Statistics provides projections from 2010 to 2020. Through a shift-share analysis (weighting each occupation's characteristic, such as wage level, by its share of total employment) we can see what the characteristics of jobs were in 2010 and what they will be in 2020 if the projections are realized.

There are a few drawbacks to this analysis. First, it does not take into account how the job requirements of a particular occupation (one of the 749 we analyze) will change over the next 10 years. For example, will the education requirements of a loan officer or a parking lot attendant grow? In other words, the changing "content" of particular jobs is a dimension of future skill requirements not captured by our analysis. Second, we have no point of historical comparison (due to lack of data availability owing to changing occupational definitions) for judging whether what is expected in the future is fast or slow relative to the past. However, there is still much to learn from how occupational composition shifts will affect the job and wage structure.

Table 4.46 shows that employment will shift to occupations with very slightly higher median annual wages, raising annual wages by a minimal 0.07 percent over 10 years, which is essentially not at all. The analysis also shows the expected changes in the distribution of employment across wage levels—multiples of the poverty-level wage ($11.06 per hour). Occupational changes over the next 10 years are expected to modestly shrink the share of workers earning poverty-level wages and wages between 100 and 200 percent of the poverty wage. There is a corresponding shift to the two highest wage categories.

Drawing on the Bureau of Labor Statistics characterization of the education and training required to enter each occupation, the table shows that the jobs of the future will require greater education credentials, but not to any great extent. According to these data, the occupational composition of jobs in 2010 required that 15.5 percent of the workforce have a college degree, and 1.4 and 3.1 percent of jobs, respectively, required a master's degree or a doctoral or professional degree. By 2020 a slightly larger share of the workforce (a total of 0.5 percent across these three education credentials) will need these levels of education because of occupational upgrading. The jobs of 2020 will entail the need to expand the share of the workforce with an associate degree from 5.6 to 5.8 percent. In contrast, occupational requirements are such that 25.9 percent of the jobs could be filled by someone without a high school or equivalent degree in both 2010 and 2020.

The education levels of the current workforce, shown earlier in Table 4.17, far exceed the education levels required for entry into occupations in 2010 or even in 2020, as shown in **Figure 4AL**. For instance, the share of the employed with a college degree in 2011 (21.9 percent) exceeds those 15.8 percent of jobs

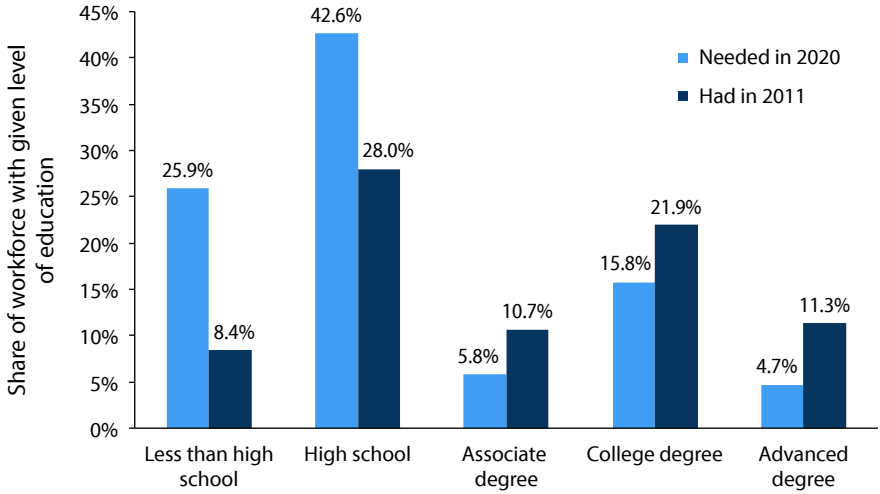
Table 4.46 Effect of changing occupational composition on wages and on education and training requirements, 2010–2020

Job characteristic	2010	2020	Change 2010–2020
Median annual wage (2010 dollars)	$39,250	$39,279	0.07%
Share of workers by wage threshold*			**Percentage-point change**
0–100% of poverty	28.3%	28.0%	-0.3
>100–200% of poverty	41.5	41.2	-0.4
>200–300% of poverty	17.5	17.7	0.2
Over 300% of poverty	12.7	13.2	0.5
Education level needed for entry			
Less than high school	25.9%	25.9%	0.0
High school diploma or equivalent	43.4	42.6	-0.8
Some college, no degree	0.6	0.6	0.0
Post-secondary nondegree award	4.6	4.7	0.1
Associate degree	5.6	5.8	0.2
Bachelor's degree	15.5	15.8	0.3
Master's degree	1.4	1.5	0.1
Doctoral or professional degree	3.1	3.2	0.2
Training level needed for entry			
Short-term on-the-job training	40.7%	40.4%	-0.3
Moderate-term on-the-job training	17.5	17.3	-0.2
Long-term on-the-job training	4.9	4.8	-0.1
Apprenticeship	1.8	1.9	0.1
Internship/residency	3.8	3.8	0.1
None	31.4	31.8	0.4
Work experience needed for entry			
Less than one year	2.2%	2.2%	0.0
One to five years	12.0	11.7	-0.3
More than five years	3.2	3.0	-0.2
None	82.6	83.1	0.5

* The per-hour wage ranges are equivalent in 2011 dollars to (poverty levels for a four-person household): $11.06 and below (0–100%), $11.07–$22.12 (>100–200%), $22.13–$33.18 (>200–300%), and $33.19 and above (300%+).

Source: Thiess (2012, Tables 5 and 6) and Bureau of Labor Statistics Employment Projections (2012, Table 9)

Figure 4AL Education needed in 2020 workforce and education levels of the 2011 workforce



Note: Totals do not sum to 100% because some categories were omitted.

Source: Authors' analysis of Thiess (2012) and Current Population Survey Outgoing Rotation Group microdata

that will need a college degree for entry in the occupation structure of 2020. Similarly, as just mentioned, more than a fourth (25.9 percent) of the jobs in 2020 could be filled by those who lack a high school credential, a group ("less than high school") in 2011 that was far smaller, just 8.4 percent of those employed. This analysis suggests that the challenge ahead is to develop jobs with greater needs for more education rather than upgrading the workforce for jobs that are otherwise unlikely to exist.

Table 4.46 also provides an assessment of the training and experience needed to be employed in an occupation. The results suggest a slight shift to the occupations that require more training (such as apprenticeships) but also a shift toward occupations that require no prior training, meaning fewer occupations will require either "one to five" or "more than five" years' experience.

These projections show that occupational upgrading will continue, as the jobs created will be in occupations with somewhat higher educational requirements than today, but that the need can be readily met by the education already offered by today's workforce. Occupational change will not lead to the need for much more training or prior work experience before entering careers. If anything, the changes in education and training requirements in these projections are more modest than seen in earlier projections and do not appear extraordinary in any

sense. Whether workers earn substantially more in the future than today will be determined primarily by how much wages in particular occupations rise rather than by any expected change in the occupational composition of jobs, including greater educational requirements.

Conclusion

The period since 2000 encompasses a few years in which the momentum from the late 1990s carried forward and brought real wage gains. However, real wages stopped growing when the 2001 recession took hold and unemployment and underemployment rose. Because of weak employment growth in the recovery, wage growth never picked up steam, and wages were flat through 2007. The Great Recession yielded persistent, high unemployment and disappointing wage growth. Consequently, the last decade has produced no improvement in real wages and a widening divergence between productivity and the wage or compensation of the typical worker. Wages of a broad range of workers, including those with either a high school or college degree, failed to improve. In addition, wage inequality has continued to grow between those at the very top and other very high earners, as well as between very high earners and those at either the 90th percentile or the median. The dip in wages at the top in the downturn and the associated stock market decline seems to have been a temporary setback for top-tier earners.

Structural factors such as the shift to lower-paying industries, increased trade competition, and deunionization have generated wage inequities and have eroded job quality. The erosion of the minimum wage (relative to past levels), sluggish job creation, continued competitive pressures from low-wage countries, and immigration have also taken their toll on the pay of low- and middle-wage earners. Young workers' wages and benefits have faltered the most, including the wages of young college graduates. In fact, the bottom 70 percent of college graduates had stagnant or falling wages over the last decade. The disappointing wage trends for blue-collar and non-college-educated workers from 1979 to 1995 have gone upscale in the 2000s; no major group of workers has escaped wage stagnation and eroded job quality.

Table and figure notes

Tables

Table 4.1. Average wages and work hours, 1967–2010. Productivity data, which measure output per hour of the total economy, including the private and public sectors, are from an unpublished series available from the Bureau of Labor Statistics Labor Productivity and Costs program on request. The wage-level data are based on the authors' tabulations of Current Population Survey Annual Social and Economic Supplement (CPS-ASEC, also known as the March CPS) microdata files using a series on annual, weekly, and hourly wages for wage and salary workers. See Appendix B for the sample definition and other information. The weekly and hourly wage data are "hour weighted," obtained by dividing annual wages by weeks worked and annual hours worked. The 1967 and 1973 values are derived from unpublished tabulations provided by Kevin Murphy from an update of Murphy and Welch (1989); they include self-employment as well as wage and salary workers. The values displayed in this table were bridged from CPS 1979 values using the growth rates in the Murphy and Welch series. Hours of work were derived from differences between annual, weekly, and hourly wage trends.

Table 4.2. Average hourly pay and pay inequality, 1948–2011. The data in the top panel are computed from the Bureau of Economic Analysis National Income and Product Accounts (NIPA) tables. "Wages and salaries" are calculated by dividing wage and salary accruals (NIPA Table 6.3) by hours worked by full-time and part-time employees (NIPA Table 6.9). "Total compensation" is the sum of wages and salaries and benefits (it includes payroll taxes and health, pension, and other nonwage benefits). Payroll taxes are calculated as total compensation (NIPA Table 6.2) minus the sum of volunteer benefits (sum of health and nonhealth benefits; see NIPA Table 6.11) and wages and salaries. "Benefits" is the difference between total compensation and wages and salaries. These data were deflated using the NIPA personal consumption expenditure (PCE, chain-weighted) index, with health insurance adjusted by the PCE medical care (chained) index. These data include both public- and private-sector workers.

The data in the Employer Costs for Employee Compensation (ECEC) panel come from the BLS National Compensation Survey's employment cost trends and benefits data and provide cost levels for March for private-sector workers, available starting in 1987. We categorize wages and salaries differently than BLS, putting all wage-related items (including paid leave and supplemental pay) into the hourly wage/salary column. This makes the definition of wages and salaries comparable to workers' W-2 earnings and to the definition of wages in the CPS Outgoing Rotation Group (ORG) data that are tabulated for other tables in this chapter. Benefits, in our definition, include only payroll taxes, pensions, insurance, and "other" benefits. The sum of wages and salaries and benefits makes up total compensation. It is important to use the ECEC (the current-weighted series) rather than the other series from the same National Compensation Survey (NCS) data, the ECI (the fixed-weighted series), because composition shifts (in the distribution of employment across occupations and industries) can have large effects over time. Employer costs for insurance are deflated by the medical-care component of the CPI-U-RS (Consumer Price Index Research Series Using Current Methods). All other pay is deflated by the CPI-U-RS for "all items." Inflation is measured for the first quarter of each year. Wage and compensation inequality measures are drawn from Pierce (2010). Pierce computes these from the NCS microdata, the data used to calculate the ECI and ECEC data.

Table 4.3. Hourly and weekly earnings of private production and nonsupervisory workers, 1947–2011. Underlying data are from the Bureau of Labor Statistics Current Employment Statistics program data from the *Employment, Hours, and Earnings–National* database, deflated using CPI-U-RS.

Table 4.4. Hourly wages of all workers, by wage percentile, 1973–2011. Table is based on analysis of CPS wage data described in Appendix B.

Table 4.5. Hourly wages of men, by wage percentile, 1973–2011. Table is based on analysis of CPS wage data described in Appendix B.

Table 4.6. Hourly wages of women, by wage percentile, 1973–2011. Table is based on analysis of CPS wage data described in Appendix B.

Table 4.7. Change in wage groups' shares of total wages, 1979–2010. Data are taken from Kopczuk, Saez, and Song (2010), Table A-3. Data for 2006 through 2010 are extrapolated from 2004 data using changes in wage shares computed from Social Security Administration wage statistics (data for 2010 at http://www.ssa.gov/cgi-bin/netcomp.cgi). The final results of the paper by Kopczuk, Saez, and Song printed in a journal used a more restrictive definition of wages so we employ the original definition, as recommended in private correspondence with Kopczuk. SSA provides data on share of total wages and employment in annual wage brackets such as for those earning between $95,000.00 and $99,999.99. We employ the midpoint of the bracket to compute total wage income in each bracket and sum all brackets. Our estimate of total wage income using this method replicates the total wage income presented by SSA with a difference of less than 0.1 percent. We use interpolation to derive cutoffs building from the bottom up to obtain the 0–90th percentile bracket and then estimate the remaining categories. This allows us to estimate the wage shares for upper wage groups. We use these wage shares computed for 2004 and later years to extend the Kopczuk, Saez, and Song series by adding the changes in share between 2004 and the relevant year to their series. To obtain absolute wage trends we use the SSA data on the total wage pool and employment and compute the real wage per worker (based on their share of wages and employment) in the different groups in 2011 dollars.

Table 4.8. Change in annual wages, by wage group, 1979–2010. See note to Table 4.7.

Table 4.9. Specific fringe benefits, 1987–2011. Table is based on ECEC data described in note to Table 4.2.

Table 4.10. Employer-provided health insurance coverage, by demographic and wage group, 1979–2010. Table is based on tabulations of CPS-ASEC data samples of private wage-and-salary earners ages 18–64 who worked at least 20 hours per week and 26 weeks per year. This sample is chosen to focus on those with regular employment. Coverage is defined as being included in an employer-provided plan for which the employer paid for at least some of the coverage. As with other CPS microdata analyses presented in the book, race/ethnicity categories are mutually exclusive (i.e., white non-Hispanic, black non-Hispanic, and Hispanic any race).

Table 4.11. Employer-provided pension coverage, by demographic and wage group, 1979–2010. Table is based on CPS-ASEC data on pension coverage, using the sample described in the note to Table 4.10. As with other CPS microdata analyses presented in the book, race/ethnicity categories are mutually exclusive (i.e., white non-Hispanic, black non-Hispanic, and Hispanic any race).

Table 4.12. Share of workers with paid leave, by wage group, 2011. Table is computed from the Employee Benefits Survey (Bureau of Labor Statistics 2011), *Holiday, Vacation, Sick, and Other Leave Benefits, March 2011,* data tables 34, 36, and 38; http://www.bls.gov/ncs/ebs/benefits/2011/benefits_leave.htm.

Table 4.13. Dimensions of wage inequality, by gender, 1973–2011. All of the data are based on analyses of the CPS-ORG data described in Appendix B and used in various tables. The measures of "total wage inequality" are natural logs of wage ratios (multiplied by 100) computed from Tables 4.5 and 4.6. The exception is 1979 data for women, which are 1978–1980 averages; we use these to smooth the volatility of the series, especially at the 10th percentile. The "between-group inequalities" are computed from regressions of the log of hourly wages on education categorical variables (advanced, college only, some college, less than high school with high school omitted), experience as a quartic, marital status, race, and region (4). The college/high school and high school/less-than-high-school premiums are simply the coefficient on "college" and "less than high school" (expressed as the advantage of "high school" over "less than high school" wages). The experience differentials are the differences in the value of age (calculated from the coefficients of the quartic specification) evaluated at 25, 35, and 50 years old. "Within-group wage inequality" is measured as the root mean square error from the same log wage regressions used to compute age and education differentials.

Table 4.14. Hourly wages by education, 1973–2011. Table is based on tabulations of CPS wage data described in Appendix B. See Appendix B for details on how a consistent measure of education was developed to bridge the change in coding in 1992.

Table 4.15. Hourly wages of men, by education, 1973–2011. See note to Table 4.14.

Table 4.16. Hourly wages of women, by education, 1973–2011. See note to Table 4.14.

Table 4.17. Educational attainment of the employed, by gender and nativity, 2011. Table is based on analysis of CPS wage earners. The data are described in Appendix B. The categories are as follows: "less than high school" is grade 1–12 or no diploma; "high school/GED" is high school graduate diploma or equivalent; "some college" is some college but no degree; "associate degree" is occupational or academic associate degree; "college degree" is a bachelor's degree; and "advanced degree" is a master's, professional, or doctoral degree.

Table 4.18. Hourly wages of entry-level and experienced workers, by gender and education, 1973–2011. Table is based on analysis of CPS wage data described in Appendix B. Entry-level wages are measured for a seven-year window starting a year after normal graduation, which translates to ages 19–25 for high school graduates and ages 23–29 for college graduates.

Table 4.19. Hourly wages by wage percentile, gender, and education, 1973–2011. Table is based on analysis of CPS wage data described in Appendix B.

Table 4.20. Contribution of within-group and between-group inequality to total wage inequality, 1973–2011. Data are from the CPS-ORG sample described in Appendix B. "Overall wage inequality" is measured as the standard deviation of log wages. "Within-group wage inequality" is the mean square error from log wage regressions (the same ones used for Table 4.13). "Between-group wage inequality" is the difference between the overall and within-group wage inequalities and reflects changes in all of the included variables: education, age, marital status, race, ethnicity, and region.

Table 4.21. Hourly wage growth by gender and race/ethnicity, 1989–2011. Table is based on analysis of CPS wage data described in Appendix B. As with other CPS microdata analyses presented in the book, race/ethnicity categories are mutually exclusive (i.e., white non-Hispanic, black non-Hispanic, and Hispanic any race).

Table 4.22. Gender wage gap, 1973–2011. Wages and ratios are based on 50th-percentile wages from Tables 4.5 and 4.6 (CPS-ORG data).

Table 4.23. Factors contributing to the productivity/compensation gap, 1973–2011. Table is based on analysis of Mishel and Gee (2012), Table 1. Mishel and Gee present a decomposition of the gap between productivity and median hourly compensation. This has been reconfigured to eliminate the gap between median hourly wages and compensation so the decomposition is between productivity and median hourly compensation.

Table 4.24. Impact of rising and falling unemployment on wage levels and gaps, 1979–2011. Table is based on analyses of yearly wage decile data from Tables 4.5 and 4.6 (see Appendix B), and of unemployment data using model from Katz and Krueger (1999). The unemployment rate is from the Current Population Survey. The simulated effect of change of unemployment presented in the table was calculated by regressing the log-change of nominal wages on the lagged log-change of the CPI-U-RS (but, following Katz and Krueger [1999], the coefficient is constrained to equal 1), the unemployment rate, lagged productivity growth, and dummies for various periods (1989–1995, 1996–2000, 2001–2007). Using these models, wages were predicted for the periods in the table given a simulated unemployment rate series in which unemployment remains fixed at its starting-year level. So in the 1979 to 1985 period, unemployment was fixed at its 1979 level and not allowed to rise (as actually happened) throughout the period. The "estimated cumulative impact of unemployment" shows the difference between actual wages and the wages when unemployment was held fixed in the starting year.

Table 4.25. Annual pay in expanding and contracting industries, 1979–2007. These data reflect the average (annual) wages, benefits, and compensation of the net new employment in each period based on changes in industry composition. The employment data are payroll counts from the BLS Current Employment Statistics, and the pay data are from 2008 Bureau of Economic Analysis NIPA tables (calculated per payroll employee). The pay of the net new employment is a weighted average of the pay by industry in which the weights are the changes in each industry's employment share over the period.

Table 4.26. Employer health care costs as a share of wages, 1948–2010. Table is based on analysis of National Income and Product Accounts data. Wage data are from NIPA Table 6.3, and group health insurance data are from NIPA Tables 6.11A-C, and 6.11D.

Table 4.27. Employer health care costs as a share of wages, by wage fifth, 1996–2008. Table is based on analysis of Burtless and Milusheva (2012) based on Medical Expenditure Panel Survey. The authors provide data by decile which we aggregated to fifths. The premiums include both those enrolled and not enrolled in employer plans. The premiums were estimated by Burtless and Milusheva using various imputation methods.

Table 4.28. Impact of trade balance in manufacturing on employment and wages, by education, 1979–2005. Table is based on analysis of Bivens (2008).

Table 4.29. Impact of trade with low-wage countries on college/noncollege wage gap, 1973–2011. Table is an update of Bivens's (2008) reanalysis of Krugman (1995) using 2011 data from the USITC Tariff and Trade DataWeb and Bureau of Economic Analysis National Income and Product Accounts.

Table 4.30. Characteristics of offshorable and non-offshorable jobs. Table reflects authors' analysis of the Bernstein, Lin, and Mishel (2007) analysis of data of Blinder (2007), matching Blinder's occupational codes to the BLS Occupational Employment Statistics (OES) survey (http://www.bls.gov/oes/) and Blinder and Krueger (2009) Table 4.

Table 4.31. Mexican and other immigrants' share of U.S. workforce, by gender, 1940–2011. Data are from Figure 1 in Borjas and Katz (2005) and authors' computations of Current Population Survey basic monthly microdata for 2000 and 2011.

Table 4.32. Educational attainment of immigrants, by gender, 1940–2011. Data are from Table 2 in Borjas and Katz (2005) and authors' computations of Current Population Survey basic monthly microdata for 2000 and 2011.

Table 4.33. Union wage premium by demographic group, 2011. "Percent union" is tabulated from CPS-ORG data (see Appendix B) and includes all those covered by unions. "Union premium" values are the coefficients on union in a model of log hourly wages with controls for education, experience as a quartic, marital status, region, industry (12) and occupation (9), race/ethnicity, and gender where appropriate. For this analysis we only use observations that do not have imputed wages because the imputation process does not take union status into account and therefore biases the union premium toward zero. See Mishel and Walters (2003). As with other CPS microdata analyses presented in the book, race/ethnicity categories are mutually exclusive (i.e., white non-Hispanic, black non-Hispanic, and Hispanic any race).

Table 4.34. Union premiums for health, retirement, and paid leave benefits. Table is based on Table 4 in Mishel and Walters (2003), which draws on Buchmueller, DiNardo, and Valletta (2001).

Table 4.35. Union impact on paid leave, pension, and health benefits. Table is based on Table 3 in Mishel and Walters (2003), which draws on Pierce (1999), Tables 4, 5, and 6.

Table 4.36. Effect of union decline on male wage differentials, 1978–2011. This analysis replicates, updates, and expands on Freeman (1991), Table 2, using the CPS-ORG sample used in other analyses (see Appendix B). The year 1978, rather than 1979, is the earliest year analyzed because we have no union membership data in our 1979 sample. "Percent union" is the share

covered by collective bargaining. The "union wage premium" for a group is based on the coefficient on collective bargaining coverage in a regression of hourly wages on a simple human capital model (the same one used for estimating education differentials, as described in note to Table 4.13), with major industry (12) and occupation (9) controls in a sample for that group. The change in union premium across years, therefore, holds industry and occupation composition constant. Freeman's analysis assumed the union premium was unchanged over time. We allow the union premium to differ across years so changes in the "union effect" on wages (the union wage premium times union coverage) are driven by changes in the unionization rate and the union wage premium. The analysis divides the percentage-point change in the union effect on wage differentials by the actual percentage-point change in wage differentials (regression-adjusted with simple human capital controls plus controls for other education or occupation groups) to determine the deunionization contribution to the change in the wage gaps among men, which, as a negative percent, indicates contribution to the growth of the wage gaps.

Table 4.37. Union wage premium for subgroups. The analysis builds on Mishel and Walters (2003), Table 2.3A and Gundersen (2003), Table 5.1 and Appendix C. Premium estimates by fifth are from Schmitt (2008); Card, Lemieux, and Riddell (2002); and Gittleman and Pierce (2007). Union coverage by fifth is from Schmitt (2008).

Table 4.38. Impact of deunionization on wage inequality, 1973–2007. Table is based on analysis of Western and Rosenfeld (2011), Table 2.

Table 4.39. Value of the minimum wage, 1960–2011. Data, deflated using CPI-U-RS, are from the U.S. Department of Labor Wage and Hour Division (2009); http://www.dol.gov/whd/minwage/chart.htm.

Table 4.40. Characteristics of workers affected by proposed minimum-wage increase to $9.80 in 2014. Table is based on Cooper (2012) analysis of CPS Outgoing Rotation Group microdata. As with other CPS microdata analyses presented in the book, race/ethnicity categories are mutually exclusive (i.e., white non-Hispanic, black non-Hispanic, and Hispanic any race).

Table 4.41. Minimum-wage impact on 50/10 wage gap, 1979–2009. Analysis is of Autor, Manning, and Smith (2010), Table 5.

Table 4.42. Role of executives and financial sector in income growth of top 1.0% and top 0.1%, 1979–2005. Table is based on authors' analysis of Bakija, Cole, and Heim (2012) Tables 4, 5, 6a, and 7a, using tables that include capital-gains income. The Bakija, Cole, and Heim paper tabulates IRS tax returns and exploits the information on the primary and secondary taxpayer occupation data provided there.

Table 4.43. CEO compensation and CEO-to-worker compensation ratio, 1965–2011. Complete details on the data used to compute CEO compensation trends and the CEO-to-worker compensation ratio can be found in Mishel and Sabadish (2012), *Methodology for Measuring CEO Compensation and the Ratio of CEO-to-Worker Compensation* at http://www.epi.org/publication/wp293-ceo-to-worker-pay-methodology. We use executive compensation data from the ExecuComp database of Compustat, a division of Standard & Poor's. The ExecuComp database contains data on many forms of compensation for the top five executives

at publicly traded U.S. companies in the S&P 1500 Index for 1992–2010. We employ two definitions of annual CEO compensation based on different ways of measuring option awards. "Realized direct compensation," referred to as "Options realized" in the table, is the sum of salary, bonus, restricted stock grants, options exercised, and long-term incentive payouts. It follows the definition of compensation used in previous editions of *The State of Working America*, which in turn adapted this definition from the *Wall Street Journal* (*WSJ*) annual report on CEO compensation (compensation reported by the *WSJ* has been compiled by various companies over the years, including Pearl Meyer, the Mercer Group, and the Hay Group and is the longest CEO pay series available to us). "Total direct compensation" (also a definition used in the *WSJ* series and labeled "Options granted" in the table) is the sum of salary, bonus, restricted stock grants, options granted (Compustat Black Scholes value), and long-term incentive payouts.

We define a CEO as an executive labeled a CEO by the variable CEOANN. Note that the executive flagged as the CEO may not necessarily be the highest-paid executive at the company. The CEOs included in our series are CEOs at the top 350 firms based on sales each year for 1992–2010.

Because no data for the compensation of an average worker in a firm exist, we create a proxy: the hourly compensation of a "typical" worker in a firm's key industry. The wage measure is the production/nonsupervisory worker hourly earnings in that industry, the same series used in Table 4.3 for the entire private sector. We obtain compensation by multiplying the compensation wage ratio computed from NIPA Tables 6.3C and 6.3D. The hourly wages of production and nonsupervisory employees in 2011 were $19.47, 21 percent higher than the median hourly wage, so our proxy severely overstates the compensation of a typical worker and understates the CEO-to-worker pay ratio.

We use the growth in CEO compensation in the *WSJ* series to extend the CEO compensation series and the CEO-to-worker compensation ratio series backward. The *WSJ* series conducted by Pearl Meyer covered the years 1965, 1968, 1973, 1978, 1989, and 1992. We convert the compensation series to constant dollars using the CPI-U-RS and calculate the ratio of CEO compensation in each year as a fraction of the 1992 CEO compensation level. We then apply these ratios to the CEO compensation for 1992 calculated from the ExecuComp data. This moves the series backward in time so that the growth of CEO pay is the same as in the Pearl Meyer/*WSJ* series but is benchmarked to the levels in the ExecuComp series.

We make a similar set of computations to obtain a historical series for the CEO-to-worker compensation ratio. We start with the Pearl Meyer/*WSJ* series in constant dollars and divide it by an estimate of private-sector annual compensation of production/nonsupervisory workers in the same year. The compensation series is the real hourly compensation series presented in Figure 4B multiplied by 2,080 hours.

Table 4.44. Trends in education wage gaps, key wage group wage gaps, and relative supply of education, 1979–2011. The gross wage gap data are computed from underlying yearly data with selected years presented in Tables 4.4 and 4.8. The education wage gaps are computed from the same regressions for which results on college/high school and high school/less-than-high-school wage premiums are reported in Table 4.13, regressions of the log of hourly wages on education categorical variables (advanced degree, college only, some college, less than high school with high school omitted), experience as a quartic, marital status, race, and region (4). The college or more/noncollege differential is drawn from a similar regression except there is only one education dummy variable for those with a college degree or advanced degree. This estimate was also used in the analysis of trade's impact on the college wage gap presented in Table 4.29.

Table 4.45. Inflation-adjusted hourly wage trends of college graduates, by occupation, 2000–2011. Table is based on tabulations of CPS-ORG data with a sample of those with a college degree (but no advanced degree). See Appendix B for information on the wage data.

Table 4.46. Effect of changing occupational composition on wages and on education and training requirements, 2010–2020. Table is based on analysis of Thiess (2012), Tables 5 and 6, and BLS Employment Projections Program (2012), Table 9.

Figures

Figure 4A. Cumulative change in total economy productivity and real hourly compensation of selected groups of workers, 1995–2011. Productivity data, which measure output per hour of the total economy, including private and public sectors, are from an unpublished series available from the Bureau of Labor Statistics Labor Productivity and Costs program on request. Wage measures are the annual data used to construct tables in this chapter: median hourly wages (at the 50th percentile) from Table 4.4 and hourly wages by education from Table 4.14. These are converted to hourly compensation by scaling by the real compensation/wage ratio from the Bureau of Economic Analysis National Income and Product Accounts (NIPA) data used in Table 4.2.

Figure 4B. Real hourly earnings and compensation of private production and nonsupervisory workers, 1947–2011. Wage data are from series used in Table 4.3. Wages are converted to hourly compensation by scaling by the real compensation/wage ratio from the NIPA data used in Table 4.2.

Figure 4C. Cumulative change in real hourly wages of men, by wage percentile, 1979–2011. See note to Table 4.5.

Figure 4D. Cumulative change in real hourly wages of women, by wage percentile, 1979–2011. See note to Table 4.6.

Figure 4E. Share of workers earning poverty-level wages, by gender, 1973–2011. Figure is based on analysis of Current Population Survey (CPS) wage data described in Appendix B. The poverty-level wage is calculated using an estimate of the four-person weighted average poverty threshold in 2011 of $23,010 (based on the 2010 threshold updated for inflation). This is divided by 2,080 hours to obtain a poverty-level wage of $11.06 in 2011. The poverty-level wage is roughly equal to two-thirds of the median hourly wage. This figure is deflated by CPI-U-RS (Consumer Price Index Research Series Using Current Methods) to obtain the poverty-level wage levels for other years. The threshold is available at the U.S. Census Bureau website.

Figure 4F. Share of workers earning poverty-level wages, by race and ethnicity, 1973–2011. See note to Figure 4E. As with other CPS microdata analyses presented in the book, race/ethnicity categories are mutually exclusive (i.e., white non-Hispanic, black non-Hispanic, and Hispanic any race).

Figure 4G. Share of total annual wages received by top earners, 1947–2010. See note to Table 4.7.

Figure 4H. Cumulative change in real annual wages, by wage group, 1979–2010. See note to Table 4.7.

Figure 4I. Share of private-sector workers with employer-provided health insurance, by race and ethnicity, 1979–2010. See note to Table 4.10.

Figure 4J. Share of pension participants in defined-contribution and defined-benefit plans, 1980–2004. Figure is based on Center for Retirement Research (2006), which used data from the Current Population Survey and the Department of Labor's Annual Return/ Report Form 5500 Series.

Figure 4K. Wage gaps among men, 1973–2011. Figure is based on ratios of yearly hourly wage by decile data presented in Table 4.5.

Figure 4L. Wage gaps among women, 1973–2011. Figure is based on ratios of yearly hourly wage by decile data presented in Table 4.6.

Figure 4M. Wage gap between the 95th and 50th percentiles, by gender, 1973–2011. Figure is based on ratios of yearly hourly wage by percentile data presented in Tables 4.5 and 4.6.

Figure 4N. College wage premium, by gender, 1973–2011. Differentials are estimated with controls for experience (as a quartic), region (4), marital status, race/ethnicity, and education, which are specified as dummy variables for less than high school, some college, college, and advanced degree. Log of hourly wage is the dependent variable. Estimates were made on the CPS-ORG data as described in Appendix B, and presented in Table 4.13.

Figure 4O. Share of the employed lacking a high school degree, by race/ethnicity and nativity status, 2011. Figure is based on tabulations of the full monthly CPS. See Appendix B for details on data.

Figure 4P. Real entry-level wages of high school graduates, by gender, 1973–2011. See note to Table 4.18.

Figure 4Q. Real entry-level wages of college graduates, by gender, 1973–2011. See note to Table 4.18.

Figure 4R. Share of recent high school graduates with employer health/pension coverage, 1979–2010. Data are computed from annual data series developed for Tables 4.10 and 4.11. The definition of recent high school graduates is the same as used in Table 4.18 for entry-level workers who are high school graduates; ages 19–25.

Figure 4S. Share of recent college graduates with employer health/pension coverage, 1979–2010. Data are computed from annual data series developed for Tables 4.10 and 4.11. The definition of recent college graduates is the same as used in Table 4.18 for entry-level workers who are college graduates; ages 23–29.

Figure 4T. Gender wage gap, by age cohort. See Moore and Shierholz (2007).

Figure 4U. Cumulative change in total economy productivity and real hourly compensation of production/nonsupervisory workers, 1948–2011. Productivity is based on unpublished Total Economy Productivity data from the Bureau of Labor Statistics Labor Productivity and Costs program. Hourly compensation for production/nonsupervisory workers is based on the wage data series used in Table 4.3. Wages are converted to hourly compensation by scaling by the real compensation/wage ratio from the NIPA data used in Table 4.2.

Figure 4V. Cumulative change in hourly productivity, real average hourly compensation, and median compensation, 1973–2011. Productivity and average hourly compensation are based on unpublished Total Economy Productivity data from the Bureau of Labor Statistics Labor Productivity and Costs program. Average hourly compensation includes those who are self-employed as well as wage and salary workers. See Mishel and Gee (2012) for more details. Median wages for all, men, and women are based on the data presented in Tables 4.4, 4.5, and 4.6, respectively. Wages are converted to hourly compensation by scaling by the real compensation/wage ratio from the NIPA data used in Table 4.2.

Figure 4W. Increase in worker wages from a 1 percentage-point fall in unemployment, by wage group. Estimates are based on a model employed by Katz and Krueger (1999). Annual changes in log wages are regressed on unemployment, lagged log-changes in the CPI-U-RS (but, following Katz and Krueger the coefficient on this is constrained to equal 1), lagged productivity growth, and dummies for 1989–1995, 1996–2000, and 2001–2007 (excluded period is 1979–1988). The sample covers the years 1979–2007.

Figure 4X. Employer health care costs as a share of annual wages, by wage fifth, 1996–2008. Figure is based on analysis of Burtless and Milusheva (2012), based on Medical Expenditure Panel Survey. See note to Table 4.27.

Figure 4Y. Imports, exports, and trade balance in goods as a share of U.S. GDP, 1947–2011. Figure is based on authors' analysis of Bureau of Economic Analysis National Income and Product Accounts, Table 1.1.6.

Figure 4Z. Manufacturing imports as a share of U.S. GDP, 1973–2011. Figure is based on analysis of U.S. International Trade Commission Tariff and Trade data (series on manufacturing trade) and Bureau of Economic Analysis National Income and Product Accounts data on gross domestic product.

Figure 4AA. Relative productivity of U.S. trading partners, 1973–2011. Figure is based on analysis of United States International Trade Commission Tariff and Trade data and the Penn World Table (Heston, Summers, and Aten 2011). For each trading partner, their share of total imports was multiplied by their levels of GDP per worker relative to the United States (using data from the Penn World Tables). The resulting products were then summed to get the average productivity level of import trading partners. The same exercise was done for exports.

Figure 4AB. Wage premium of offshorable jobs, by gender and education. Figure is based on analysis of Bernstein, Lin, and Mishel (2007).

Figure 4AC. Union coverage rate in the United States, 1973–2011. Data are from Hirsch and Macpherson (2003), http://unionstats.gsu.edu/Hirsch-Macpherson_ILRR_CPS-Union-Database.pdf; updated at unionstats.com. The data on union coverage begin in 1977 and are extended back to 1973, based on percentage-point changes in union membership shares in Hirsh and Macpherson (2003).

Figure 4AD. Real value of the minimum wage, 1960–2011. Underlying data are from U.S. Department of Labor Wage and Hour Division (2009), deflated using CPI-U-RS; see note to Table 4.39.

Figure 4AE. Minimum wage as a share of average hourly earnings, 1964–2011. The data are the minimum wage divided by the average hourly earnings of production and nonsupervisory workers. Minimum-wage levels are from Table 4.39, and average hourly earnings are from the series used in Table 4.3.

Figure 4AF. Real value of the federal minimum wage and share of workforce covered by higher state minimums, 1979–2011. The figure is based on analysis of U.S. Department of Labor (2009) and Cooper (2012) update of Shierholz (2009).

Figure 4AG. Share of worker hours paid at or below the minimum wage, by gender, 1979–2009. Figure is based on analysis of Autor, Manning, and Smith (2010), Figure 1. Estimates are of the share of hours worked for reported wages equal to or less than the applicable state or federal minimum wage.

Figure 4AH. CEO-to-worker compensation ratio (options granted and options realized), 1965–2011. Figure is based on data developed for Table 4.43.

Figure 4AI. Growth in relative demand for college graduates, 1940–2005. Figure is based on authors' analysis of Goldin and Katz (2008), Table 1.

Figure 4AJ. Cumulative change in real hourly wages of college graduates, by decile, 2000–2011. Figure is based on authors' analysis of CPS-ORG data using a sample of college graduates (but no advanced degree). See Appendix B for data details**.**

Figure 4AK. Underemployment of college graduates, by age, 2000–2010. Figure is based on authors' analysis of Fogg and Harrington (2011), Table 1. "Underemployment" occurs when a college graduate works in an occupation that does not require a college education.

Figure 4AL. Education needed in 2020 workforce and education levels of the 2011 workforce. Figure is based on authors' analysis of Thiess (2012) for Table 4.46 and education attainment data from Table 4.17.