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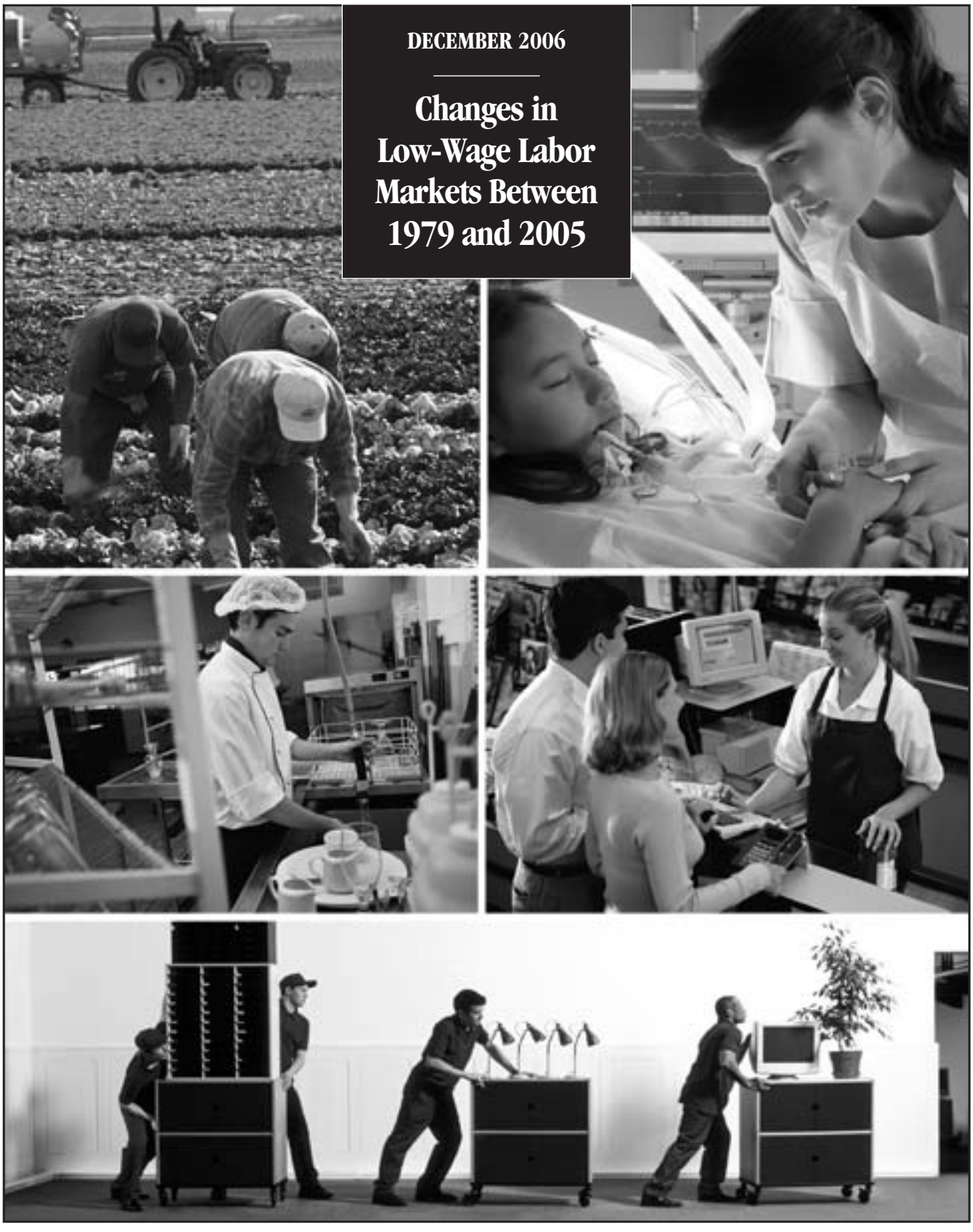
Changes in Low-Wage Labor Markets Between 1979 and 2005



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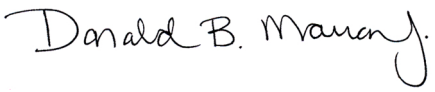
The Congress of the United States ■ Congressional Budget Office

Preface

This Congressional Budget Office (CBO) paper—prepared at the request of the Chairman of the Senate Budget Committee—uses data from several national surveys to examine the distribution of hourly wage rates over the past 25 years, focusing particularly on low-wage labor markets. It examines trends in the wages paid to workers at the bottom of the wage distribution and considers explanations for those trends. It also describes the characteristics of low-wage jobs and of workers in those jobs. In keeping with CBO's mandate to provide objective, impartial analysis, this paper makes no recommendations.

Nabeel Alsalam, Molly Dahl, and Thomas DeLeire wrote the paper under the guidance of Ralph Smith and Bruce Vavrichek. The paper benefited from the comments of Robert Dennis, Naomi Griffin, Noah Meyerson, and Roberton Williams, all of CBO, as well as Lawrence Katz of Harvard University and Marvin Kosters of the American Enterprise Institute. (The assistance of external reviewers implies no responsibility for the final product, which rests solely with CBO.)

Cameron Fletcher edited the paper, with assistance from John Skeen, and Christine Bogusz proofread it. Maureen Costantino designed the cover and prepared the paper for publication. Lenny Skutnik produced the printed copies, and Simone Thomas prepared the electronic version for CBO's Web site (www.cbo.gov).



Donald B. Marron
Acting Director

December 2006

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Changes in Low-Wage Labor Markets Between 1979 and 2005

Summary and Introduction

In 2005, the typical hourly wage rate earned by U.S. workers was 10 percent higher in real (inflation-adjusted) terms than it was in 1979, with all of that increase occurring since 1990. Workers' hourly wage rates near the bottom of the wage distribution fell by 10 percent during the 1980s but rose by more than the typical wage rate between 1990 and 2005. The economic factors that led to an increase in the dispersion of wage rates in the lower half of the distribution during the 1980s have changed and reduced this dispersion since 1990.

Changes in the distribution of hourly wages are a useful barometer of changes in the skills possessed by workers and in the value that employers place on workers' skills and activities. As employers pay college graduates more and high school dropouts less, for example, many workers have an incentive to acquire more education: since 1979, the percentage of workers with less than a high school education has dropped by half, and the percentage with a bachelor's degree has risen by more than half.

This paper documents changes in the lower half of the hourly wage distribution between 1979 and 2005 and analyzes the reasons for those changes. It then describes the characteristics of low-wage jobs and of workers in those jobs, and it examines how the household income of such workers has changed over the past quarter century. The analysis focuses on two periods: before and after 1990. The year 1990 was chosen for expositional simplicity, not because it represented a specific turning point in the labor market. For example, the 10th percentile of real hourly wage rates grew rapidly beginning in about 1995, while the ratio of the median to the 10th percentile of wages peaked in 1988.

The major findings of the paper are these:

- Notwithstanding an overall widening in the distribution of wage rates over the past quarter century, all of the widening in the lower half of the hourly wage distribution occurred in the 1980s (see Figure 1). Since 1990, real hourly wage rates at the bottom of the distribution have increased substantially—slightly more than the typical wage rate (see Figure 2).

- The changes in the distribution of wage rates since 1979 appear to be the result of changes in the premiums paid by employers for skills and attributes beyond those associated with a worker's education or experience. Those abilities may include motivation or problem-solving skills, for example—that is, traits that employers reward but that are not measured in survey data. A portion of the changes in the 1980s also may be accounted for by factors such as the decline in union coverage and the falling real value of the minimum wage.

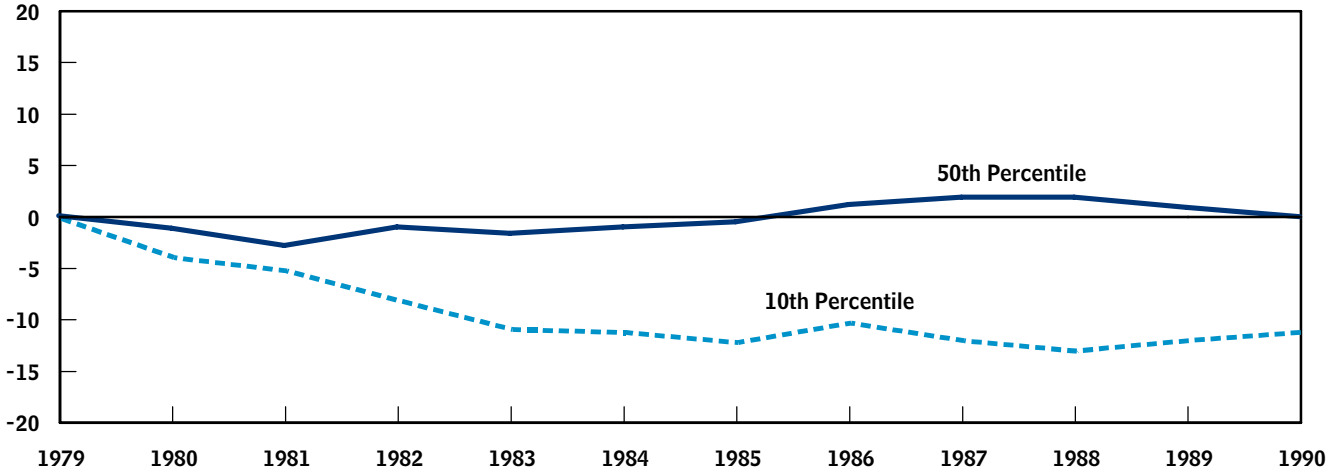
- Large percentages of workers in low-wage jobs have little education or are young. However, throughout the past quarter century, the education levels and ages of workers in low-wage jobs have been increasing, as have those of the workforce as a whole.

- The median household income (pretax and including cash transfers such as welfare) of workers earning low hourly wage rates fell in real terms between 1979 and 1990 but rose between 1990 and 2005. In both periods, decreases in the number of workers in the household reduced household income. But in the latter period, increases in the number of hours worked by low-wage earners along with increases in real hourly wage rates more than offset that decline.

Figure 1.

Percentage Growth in Real Hourly Wages at the 10th and 50th Percentiles, 1979 to 1990

(Percent)



Source: Congressional Budget Office based on the Census Bureau's Current Population Surveys from 1979 to 1990.

Note: Hourly wage rates were adjusted for inflation using the research series for the consumer price index for all urban consumers (CPI-U-RS). The 10th percentile and 50th percentile real hourly wage rates were $7.43 and $13.47, respectively, in 1979.

While the data used for hourly wage rates are of high quality and come from a large nationally representative survey collected by the U.S. Census Bureau, they do not include other forms of compensation such as pensions and health insurance. Moreover, the measures of annual wage and salary earnings and of pretax household income used in this analysis do not include the value of Medicaid, food stamps, other in-kind transfers, nor payments through the state and federal tax systems such as the earned income tax credit.

What Accounts for Changes in the Wage Distribution?

The analysis presented in this paper begins by examining two factors that are known to affect the distribution of hourly wage rates and that might explain why dispersion in the bottom half of the wage distribution increased in the 1980s but decreased slightly in the 1990s. First, workers' characteristics such as age, education, and sex are associated with wages; therefore, one would expect that the significant changes since 1979 in those characteristics would affect the dispersion of wages. The increases in education levels during the period should have increased wage dispersion, as there tends to be more variation in wages among workers with a high level of education than among workers with a low level of education. Similarly, the increase in the percentage of the workforce who are women should have tended to narrow wage differences, as the variation in wages among women is smaller than that among men. Second, the typical wage premiums associated with those characteristics have changed over the past quarter century, and one would expect those changes also to have affected the distribution of wages. For example, it has been well documented that highly educated workers increasingly have been paid more by employers relative to less educated workers.[1]

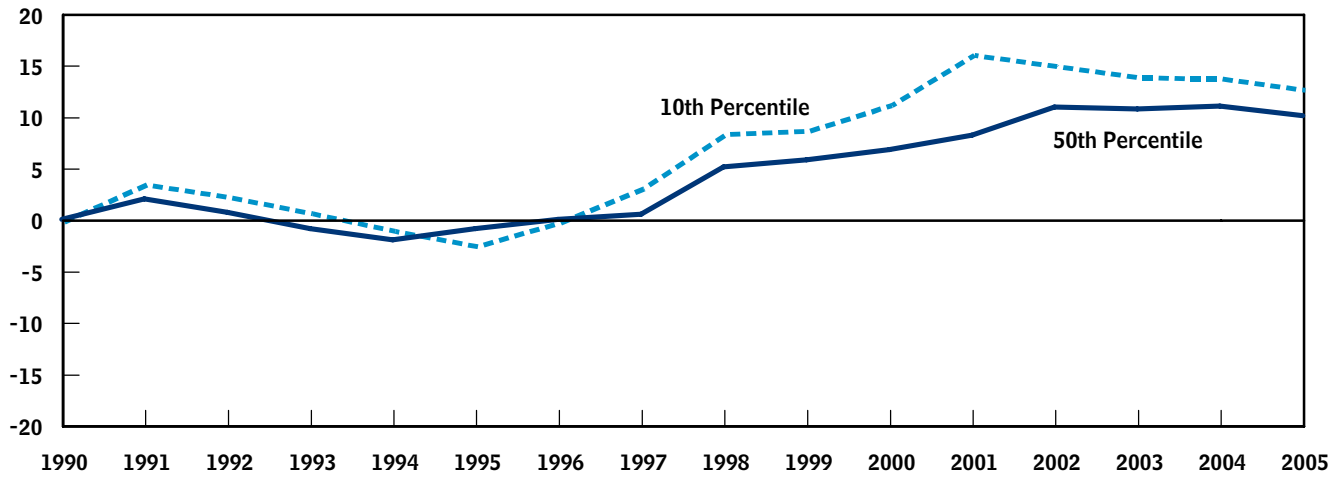
Surprisingly, however, those two factors account for less than one-third of the increase in the dispersion in the bottom half of the hourly wage distribution in the 1980s and for none of the decrease afterward. In fact, on the basis of those two factors alone, one would have expected wage dispersion to have increased in the 1990s, instead of decreasing as it did.

1. See Lawrence F. Katz and David H. Autor, "Changes in the Wage Structure and Earnings Inequality," in Orley Ashenfelter and David Card, eds., *Handbook of Labor Economics,* vol. 3A (Amsterdam: North-Holland, 1999).

Figure 2.

Percentage Growth in Real Hourly Wages at the 10th and 50th Percentiles, 1990 to 2005

(Percent)



Source: Congressional Budget Office based on the Census Bureau's Current Population Surveys from 1990 to 2005.

Note: Hourly wage rates were adjusted for inflation using the research series for the consumer price index for all urban consumers (CPI-U-RS). The 10th percentile and 50th percentile real hourly wage rates were $6.60 and $13.46, respectively, in 1990.

What, then, explains the changes in the bottom half of the wage distribution? They are accounted for by changes in the distribution of wages among workers who appear similar, on the basis of their level of education, age, and sex. That "within-group" dispersion accounted for more than two-thirds of the increased wage dispersion in the 1980s. In the 1990s, by contrast, the within-group dispersion in wages decreased enough to offset the tendency toward greater dispersion that resulted from the continued increases both in workers' education levels and in the premiums paid to educated and experienced workers.

Research suggests that changes in within-group wage dispersion were driven by changes both in how employers valued workers' skills (independently of differences captured by age, education, and sex) and in the supply of those skills.[2] Factors such as the motivation, intelligence, or specific educational or vocational background of a worker are valued by employers but may not be easily observed. Although the research presented in this analysis does not indicate whether changes in employer demand or in worker supply were more important in contributing to changes in within-group wage dispersion, other research suggests that changes in demand (resulting from, for example, changes in information technologies) were more important. Furthermore, some research indicates that institutional factors such as the decline of the real value of the minimum wage increased hourly wage dispersion in the 1980s.

The Characteristics of Low-Wage Jobs and Workers

The general features of jobs that pay low wages have not changed much over the past quarter century. Such jobs are still very likely to be compensated on an hourly basis as opposed to a salaried basis and are less likely to be on a full-time work schedule. While low-wage jobs exist in most occupations, they remain most prevalent in low-skill service occupations such as food service and preparation, building and grounds maintenance, and sales.

By contrast, the characteristics of the overall workforce have changed substantially during the past 25 years. The share of workers who are young (ages 16 to 24) decreased. Women increased their participation in the labor force. Older cohorts of workers with low levels of education left the workforce and were replaced by younger generations with higher educational attainment. And many more immigrants came to the United States (both legally and illegally) to work.

2. Katz and Autor, "Changes in the Wage Structure and Earnings Inequality."

Those trends in the composition of the workforce as a whole are generally reflected in the composition of the workforce in low-wage jobs. Young people today account for a smaller share of low-wage work than in the past (although young workers are much more likely to find themselves in low-wage work today than their counterparts were in 1979). A similar pattern applies to workers who have not completed high school. In addition, since 1994 (the first year for which data are available), the share of low-wage work done by the foreign born increased by 50 percent, as did their share of all work. Women, however, now account for a smaller share of low-wage work, although they do a larger share of all work.

The Household Income of Workers in Low-Wage Jobs

Hourly wage rates are only one of several factors that determine household income. Other factors are the number of hours worked by a worker, the number and earnings of other workers in the household, and other sources of cash income (such as cash assistance, unemployment insurance, and child support).

Despite the fact that the 10th percentile of real hourly wage rates was about the same in 2005 as in 1979, the real annual earnings of workers earning low wages increased over the period because their number of hours worked increased. At the same time, the number of other workers in the households of workers earning low wages decreased. Among low-wage earners in 2005, approximately 1 in 4 was the only worker in the household, up from about 1 in 5 in 1979; and about 34 percent were responsible for the majority of household earnings, up from 30 percent in 1979.

The net effect of those changes was that the median real household income of workers earning a low hourly wage fell between 1979 and 1990, primarily because the decline in the number of other workers in the household offset the increase in the annual earnings of workers in low-wage jobs (which was driven by increases in the hours worked since hourly wage rates at the bottom of the wage distribution declined between 1979 and 1990). However, between 1990 and 2005, that trend was reversed because the increase in the real annual earnings of the worker earning a low hourly wage (driven by both increases in the hours worked and increases in hourly wage rates) offset the decline both in the number of other workers in their households and in other sources of cash income.

The Distribution of Wages and How It Changed Between 1979 and 2005

In 2005, hourly wage rates were higher at most points in the wage distribution than in 1979, in inflation-adjusted terms.[3] For example, the median wage was $14.82 in 2005, up 10 percent from its value in 1979 after an adjustment for inflation (see Table 1).[4] Wages at the 10th percentile, however, were essentially unchanged, in real terms, over that period.

The Level and Distribution of Hourly Wage Rates

Over the past 26 years, real hourly wage rates in the U.S. labor market grew substantially faster at the top than at the middle and faster at the middle than at the bottom of the wage distribution. Thus, both dispersion in the top half of the distribution (as measured by the ratio of the 90th percentile of hourly wage rates to the median) and dispersion in the bottom half (as measured by the ratio of the median to the 10th percentile of hourly wage rates) increased between 1979 and 2005 (see Figure 3).

However, the entire widening of the bottom half of the wage distribution occurred during the 1980s. In 2005, the 10th percentile of hourly wage rates was $7.44, and the median wage was $14.82, almost exactly double that

3. The year 1979 is the first year for which the data source used for the analysis, the Census Bureau's Current Population Survey, Outgoing Rotation Groups, is available. The distribution of hourly wage rates in the analysis includes the wages earned by all workers age 16 and older, including hourly workers, salaried workers, and part-time workers (excluding self-employed workers) and is weighted by the number of hours worked per week. Generally, the latter number is defined as usual hours worked per week, but for between 5 percent and 7 percent of cases in the years after 1993, the number of actual hours worked during the preceding week was used instead. See the appendix for a complete description of how hourly wage rates are calculated.

4. The consumer price index research series using current methods (CPI-U-RS) was used to inflate past wages. That series modifies older values of the consumer price index for all urban consumers (CPI-U) to incorporate more recent changes in the methods used to calculate the inflation rate. See www.bls.gov/cpi/cpiurstx.htm. The CPI-U-RS grew at a somewhat slower rate than the CPI-U, which had the effect of increasing the growth rate of real wages compared with what would have been calculated with the other series.

Table 1.

Distribution of Inflation-Adjusted Hourly Wages of Workers Age 16 and Older, Selected Years from 1979 to 2005

						Percentage Change				
	1979	1990	1994	2000	2005	1979-1990	1990-2000	1990-2005	2000-2005	1979-2005
Percentiles[a] (Wages in 2005 dollars)										
10th	7.43	6.60	6.54	7.35	7.44	-11.1	11.3	12.8	1.3	0.2
50th	13.47	13.46	13.19	14.38	14.82	-0.1	6.8	10.1	3.1	10.0
90th	25.97	28.35	28.98	31.79	33.45	9.2	12.1	18.0	5.2	28.8
Ratios										
50th to 10th percentile	1.81	2.04	2.02	1.96	1.99	12.4	-4.1	-2.4	1.8	9.8
90th to 50th percentile	1.93	2.11	2.20	2.21	2.26	9.3	5.0	7.2	2.1	17.1
90th to 10th percentile	3.50	4.30	4.43	4.33	4.49	22.8	0.7	4.6	3.9	28.5

Source: Congressional Budget Office based on data from the Bureau of the Census's Current Population Surveys.

Note: Hourly wages are weighted by the hours worked per week and shown in 2005 dollars based on the research series of the consumer price index for urban consumers, which grew at an average annual rate of 3.6 percent between 1979 and 2005.

a. Percentiles represent the percentage of hours paid at or less than the wage shown in each year. Thus, in 1979, 10 percent of hours worked were paid at a rate of $7.43 or less per hour.

of the 10th percentile (as shown in Table 1). The ratio of the median to the 10th percentile of hourly wage rates increased by 12.4 percent during the 1980s and declined by 2.4 percent after 1990. The top half of the wage distribution widened over the entire 1979–2005 period. The ratio of the 90th percentile of hourly wage rates to the median wage increased by 9.3 percent during the 1980s and another 7.2 percent after 1990. The 90th percentile of hourly wage rates was $33.45 in 2005, about 2.3 times the median wage.

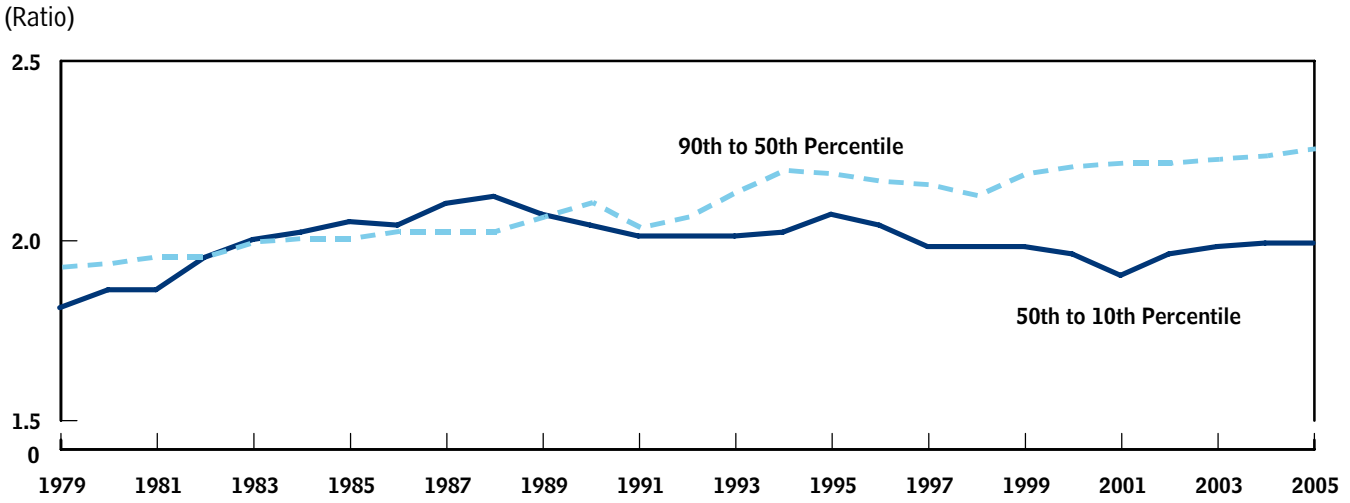
The slight narrowing of the bottom half of the wage distribution after 1990 occurred during a period in which both the 10th percentile and the median wage outpaced inflation. By contrast, the widening in the bottom half of the wage distribution between 1979 and 1990 occurred in a period of slow wage growth, when the 10th percentile wage declined in real terms by 1.1 percent per year and the real median wage remained essentially unchanged. Between 2000 and 2005, real wages increased at the 10th, 50th, and 90th percentiles. However, wages at the 10th percentile did not rise as fast as they had during the 1990s and did not rise as fast as the median real wage. Consequently, dispersion in the bottom half of the wage distribution increased slightly over the period, somewhat offsetting the narrowing that occurred during the 1990s.

Two important caveats apply to this discussion of changes in the distribution of wage rates. First, changes in the 10th percentile of the wage distribution over time, for example, should not be confused with changes in the hourly wage rates received by individual workers who were initially paid a wage equal to the 10th percentile because workers receiving an hourly wage at any given percentile of the wage distribution are not the same workers from year to year. Workers at the bottom of the wage distribution, particularly young workers, typically see their wages grow rapidly in real terms as they acquire job experience or skills (see Box 1 on page 8).

Second, trends in the distribution of hourly wage rates can—and do—differ from trends in the distribution of annual earnings of workers or the distribution of annual incomes of households. In fact, while the bottom half of the individual earnings distribution narrowed substantially between 1979 and 2005, the bottom half of the

Figure 3.

Ratio of the 90th to the 50th and the 50th to the 10th Percentiles of Hourly Wages, 1979 to 2005



Source: Congressional Budget Office based on data from the Bureau of the Census, Current Population Surveys, 1979 to 2005.

household income distribution widened between 1979 and 1983 but not afterward (see Box 2 on page 10).[5]

What Accounts for the Changes in the Bottom Half of the Wage Distribution?

As noted above, dispersion in the bottom half of the hourly wage distribution increased between 1979 and 1990 and decreased between 1990 and 2005. The Congressional Budget Office (CBO) conducted an analysis to determine what part of those changes in dispersion was accounted for by changes in each of the following factors: the education, age, and sex composition of the workforce; the distribution of wages within each group of workers defined by their level of education, age, and sex; and differences in median wages among those groups (see Table 2). Age is used as it is a proxy for the labor market experience of workers. Although it is a good proxy for most workers, it is less good for workers who have spent time out of the labor force for reasons such as childrearing. The analysis separated the workforce into 32 groups based on four categories of educational attainment (less than 12 years of schooling, a high school diploma or the equivalent, some college, and a college degree), four age categories (ages 16 to 24, 25 to 44, 45 to 64, and 65 and older), and sex.[6] The appendix provides more detail and an explanation of the methodology.

The analysis revealed that several factors explain the increased dispersion in wages in the bottom half of the distribution during the 1980s and the slight decrease afterward. The characteristics of the workforce changed significantly: education levels increased, women increased their share of work, and the workforce grew older. Those compositional changes alone would have somewhat increased dispersion in the bottom half of the wage distribution both during the period from 1979 to 1990 and the period from 1990 to 2005. Another contributing factor was demand- and supply-related changes in the median wages paid to different groups of workers: the median wages of groups of college graduates rose relative to

5. See also Peter Gottschalk and Sheldon Danziger, "Inequality of Wage Rates, Earnings, and Family Income in the United States, 1975–2002," *Review of Income and Wealth*, vol. 51, no. 2 (2005), pp. 231–254.

6. It would have been desirable to further subdivide the workforce by nativity. Foreign-born workers typically have poorer English-language skills than native-born workers, which may affect their wage rate. However, information on nativity did not become regularly available until 1994. Foreign-born workers are briefly discussed in the next section, on the characteristics of workers in low-wage jobs; see also Box 3 for a discussion of the effect of the increase in foreign-born workers since 1994 on changes in the distribution of wages.

Table 2.

Sources of Change in the Bottom Half of the Hourly Wage Distribution, 1979 to 2005

(Percentage change)

	1979-1990	1990-2005
Within-Group[a]	8.6	-4.1
Composition[b]	1.6	1.0
Education	3.5	1.0
Age	*	*
Sex	-1.9	*
Between-Group[c]	2.2	0.7
Total	**12.4**	**-2.4**

Source: Congressional Budget Office based on data from the Bureau of the Census's Current Population Surveys, 1979, 1990, and 2005.

Notes: Change is measured as the percentage change in the ratio of the 50th to the 10th percentiles of hourly wages. (The appendix describes the methods used to develop the estimates for this table.)

* = change of less than 0.1 percent.

a. Resulting from changes in the distribution of wages within each worker subgroup (defined by level of education, age, and sex).

b. Change in the ratio if the composition of the workforce had changed but the distribution of wages within each subgroup had stayed the same.

c. Change in the ratio if the median wages in each subgroup had changed but the distribution within each subgroup had stayed the same.

those of high school graduates, while the median wages of groups of high school dropouts fell relative to those of high school graduates. Those between-group changes alone also would have increased wage dispersion during both periods.

By far, however, most of the increase in wage dispersion in the 1980s, and all of the subsequent decrease, occurred within groups of workers defined by education, age, and sex. For example, the dispersion in wages among men ages 45 to 64 with a high school education was larger in 1990 than it was in either 1979 or 2005. The analysis showed that such "within-group" variations were more important in accounting for the changes in the bottom half of the wage distribution than were changes in the sizes of the various groups or in each group's median wage.

The variation in within-group dispersion probably stems from variation in how employers value workers' skills and attributes distinct from those associated with measurable characteristics. Such abilities might include problem-solving skills, interpersonal skills, or persistence. The value of those abilities, which employers discern and reward but are not measured in survey data, might be based on employers' demand for or in the supply of those abilities within groups of workers.[7] The evidence that those skills are distinct from those related to education and age is further supported by the fact that, in contrast to trends in within-group dispersion, the returns to education and age increased over the entire 1979–2005 period.

Changes in Within-Group Wage Dispersion. As with the overall dispersion of wages, changes in the dispersion within the 32 groups defined by education, age, and sex led to an increase in the overall dispersion of wages in the period up to 1990 and led to a decrease thereafter and accounted for most of the widening in the bottom half of the wage distribution during the 1980s.

Between 1990 and 2005, as dispersion in the bottom half of the wage distribution narrowed slightly (by 2.4 percent), reductions in within-group wage dispersion alone would have narrowed it even more (by 4.1 percent) (see Table 2). The reversal after 1990 suggests that workers' skills are multidimensional and cannot simply be explained by education and experience. Moreover, changing

7. Similar explanations for variation in within-group wage dispersion have been made by Lawrence F. Katz and Kevin M. Murphy, "Change in Relative Wages: 1963–1987: Supply and Demand Factors," *Quarterly Journal of Economics,* vol. 107, no. 1 (1992), pp. 35–78; and Chinhui Juhn, Kevin M. Murphy, and Brooks Pierce, "Wage Inequality and the Rise in Returns to Skill," *Journal of Political Economy,* vol. 101, no. 3 (1993), pp. 410–442. Other researchers such as David Card and John DiNardo ("Skill-Biased Technological Change and Rising Wage Inequality: Some Problems and Puzzles," *Journal of Labor Economics,* vol. 20, no. 4 [2002], pp. 733–783) argue that rising within-group wage dispersion was an episodic event better explained by changes in institutional factors such as the decline in the real value of the minimum wage. Thomas Lemieux ("Increased Residual Wage Inequality: Composition Effects, Noisy Data, or Rising Demand for Skill?" *American Economic Review,* vol. 96, no. 3 [2006], pp. 461–498) argues that growth in overall wage inequality was largely due to compositional effects linked to increases in experience and education.

Box 1.

Growth in the Wages of Individuals in Low-Wage Jobs

Most workers have their real (inflation-adjusted) hourly wage rate grow over time. For instance, over a 36-month period beginning in late 2000, half of workers experienced real wage growth of 4.8 percent or more (see the table). In comparison, the median wage for all workers in 2003 was 3.6 percent higher than the median wage for all workers in 2000. Thus, changes in the distribution of hourly wage rates do not necessarily reflect the growth over time in the hourly wage rates received by any particular worker.

The amount of individual wage growth can vary widely on the basis of a number of factors, including characteristics of the worker, such as age, experience, and education, and may vary over the business cycle. Younger workers tend to experience larger wage growth than older workers. Younger workers' larger wage growth may be partially due to the fact that many of them are completing their education, potentially moving from low-wage work (often associated with the flexible schedule required to attend school) to full-time employment after graduation. Attaining a degree, in and of itself, is also likely to contribute to upward mobility in hourly wage rates. In addition, as young workers (regardless of educational attainment) age, they gain valuable experience quickly, resulting in relatively large wage increases for some.

Growth in an individual's wages can also vary by other characteristics of the worker or by characteristics of the firm. For example, an individual's attitude toward work or the suitability of the job match can affect wage growth, as can the size of the firm or the nature of the industry.[1]

1. For evidence on the earnings growth of individuals with low earnings (closely related to the wage growth of individuals in low-wage jobs), see Fredrik Andersson, Harry J. Holzer, and Julia I. Lane, *Moving Up or Moving On: Who Advances in the Low-Wage Labor Market?* (New York: Russell Sage Foundation, 2005).

Wage Growth of Workers Age 16 and Older, by Age and Initial Position in the Wage Distribution, 1996 to 1999 and 2000 to 2003

(Percent)	1996 to 1999[a]	2000 to 2003[b]
All Workers	8.3	4.8
Age		
16 to 24	25.7	14.9
25 to 44	8.3	4.9
45 to 64	3.6	2.3
65 and older	3.9	0.6
Wage Distribution Position[c]		
10th percentile	31.8	18.8
50th percentile	5.2	3.8
90th percentile	0.6	-1.9

Source: Congressional Budget Office based on data from the 1996 and 2001 panels of the Bureau of the Census's Survey of Income and Program Participation.

Note: The sample comprises individuals age 16 or older in the first month of each panel for whom an hourly wage can be determined in both the 1st and 36th months of the panel. The hourly wage is the reported hourly wage associated with the job for which the individual reports the highest earnings in that month. If an hourly wage is not reported, one is calculated by dividing earnings at that job by the multiple of usual hours worked per week at that job and number of weeks in that month. Wages are inflated to 2005 dollars using the research series of the consumer price index for urban consumers.

a. Month 1 of observation is between December 1995 and March 1996, inclusive; month 36 is between November 1998 and February 1999, inclusive.

b. Month 1 of observation is October 2000 to January 2001, inclusive; month 36 is September 2003 to December 2003, inclusive.

c. Individuals are ranked by their hourly wage in month 1 of the panel; wage growth is the percentage growth in hourly wages from month 1 to month 36. Increases are calculated at approximately the percentiles indicated.

Box 1.

Continued

Wage growth also varies by position in the wage distribution. In both the late 1990s and early 2000s, individuals with low wages experienced substantially higher wage growth than those at the median or at the 90th percentile of wages. Across the distribution, hourly wages rates grew faster during the late 1990s than in the early 2000s.

Growth in hourly wage rates may appear higher among workers with initially low wage rates because of measurement error or transitory fluctuations in hourly wage rates, but analyses indicate that the issue is probably a small concern. First, wage growth among workers paid on an hourly basis (for whom hourly wage rates are less likely to be measured with error) was similar to that for all workers (as reported in the table). Second, categorizing workers' position in the wage distribution using a month other than those used to calculate the 36-month growth in hourly wage rates, moreover, leads to only a slight reduction in that growth.[2]

Increases in workers' wages may be due to pay increases at the same job or transitions to different jobs with higher wages. Increases in wages at the same job are often associated with increases in experience and skills specific to that employer; increases in wages after a job transition are often associated with a new firm or position for which a worker is better suited. Of course, a worker might also experience declining real wages if, for instance, pay increases do not keep pace with increasing prices or if a job change is associated with a decrease in pay, perhaps due to the closing of a plant where the worker had job seniority.

2. In particular, workers' position in the wage distribution was determined in the fifth month, as opposed to in the first month (their initial hourly wage rate). That change eliminates any mechanical relationship between wage growth between the first and 36th month and initial wages that might be the result of measurement error in the hourly wage rate reported in the first month. However, those calculations also shorten the period over which a worker could move out of low-wage work, which also would tend to reduce the amount of observed wage growth.

employer demand for unmeasured skills can have a different pattern from changing demand for educated workers. One possibility, which requires more investigation by researchers, is that computerization has enhanced the demand for nonroutine cognitive work (which pays high wages), reduced the demand for routine cognitive work (which pays average wages), and had little effect on the demand for nonroutine manual work (which pays low wages). That explanation would be consistent with the continuation of increasing top-half dispersion and the slowing or decreasing of bottom-half dispersion in wages.[8]

Compositional Changes in the Workforce. As mentioned above, the changes in the composition of the workforce based solely on educational attainment, age, and sex would have increased the dispersion in wages during both the 1979–1990 period and the 1990–2005 period. Specifically, such changes can account for 1.6 percentage points of the 12.4 percent widening of the bottom half of the wage distribution between 1979 and 1990.[9] That is, had the distribution of wages both within and among the 32 education, age, and sex categories remained in 1990 what they were in 1979, the ratio of the median to the 10th percentile of real hourly wage rates would have increased by only 1.6 percent.

That 1.6 percentage-point increase represents the net contribution of the changing education, age, and sex

8. David Autor, Lawrence Katz, and Melissa Kearney, *Polarization of the U.S. Labor Market,* Working Paper No. 11986 (Cambridge, Mass.: National Bureau of Economic Research, January, 2006).

9. Between 1979 and 2005, the percentage of workers who were women increased from 40 percent to 45 percent. The percentage of workers ages 16 to 24 declined from 22 percent to 13 percent. The percentage of workers with a bachelor's degree increased from 19 percent to 31 percent, and the percentage with less than a high school education declined from 22 percent to 11 percent.

Box 2.

The Distribution of Workers' Annual Earnings and Household Income

While hourly wage rates are a useful indicator of the supply and value of workers' skills in the labor market, annual earnings and household income are arguably better indicators of overall economic well-being.[1] On the one hand, dispersion in the earnings distribution has narrowed since 1979 (with earnings at the 10th percentile increasing more quickly than earnings at the 50th or 90th percentiles); on the other, dispersion in the adjusted household income distribution has widened over the same time period.

A worker's total annual earnings are determined by both the hourly wage rate and the number of hours worked per year. Therefore, it is generally not the case that a worker at the 10th percentile of wages, for instance, will also be at the 10th percentile of earnings.[2] Low-wage workers can have relatively high earnings if they work many hours, and, conversely, high-wage workers can have relatively low earnings if they work very few hours.

Between 1979 and 2005, earnings at the 10th percentile more than doubled, while those at the median increased by approximately 25 percent (see the top panel of the figure). The relative earnings growth of those at the 10th percentile as compared with those at the 50th percentile resulted primarily from large relative increases in the annual hours worked, driven by increases in the number of weeks worked (as opposed to the number of hours per week) for those at the 10th percentile. Thus, dispersion in the bottom half of the earnings distribution narrowed between 1979 and 2005.

Household income is a broader measure of the resources shared by members of a household than the individual worker's earnings.[3] Household income implicitly distributes a worker's earnings among members of the household. In addition, it includes a share of the earnings of other family members as well as unearned income.

During the past 25 years, dispersion in the adjusted household income of workers increased in both the bottom and top halves of the distribution, as it increased more at the median than at the 10th percentile and more at the 90th percentile than at the median (see the bottom panel of the figure). Dispersion in the bottom half of the income distribution of workers has widened only slightly since 1983; most of the widening observed between 1979 and 2005 occurred between 1979 and 1983.

1. Annual earnings, like the hourly wage rate, do not capture noncash benefits, such as health insurance (both public and private); in-kind transfers, such as food stamps; or income received through the tax system, such as that received from refunds through the earned income tax credit.

2. If all workers put in the same number of hours per year, the individual at the 10th percentile of wages would also be at the 10th percentile of earnings.

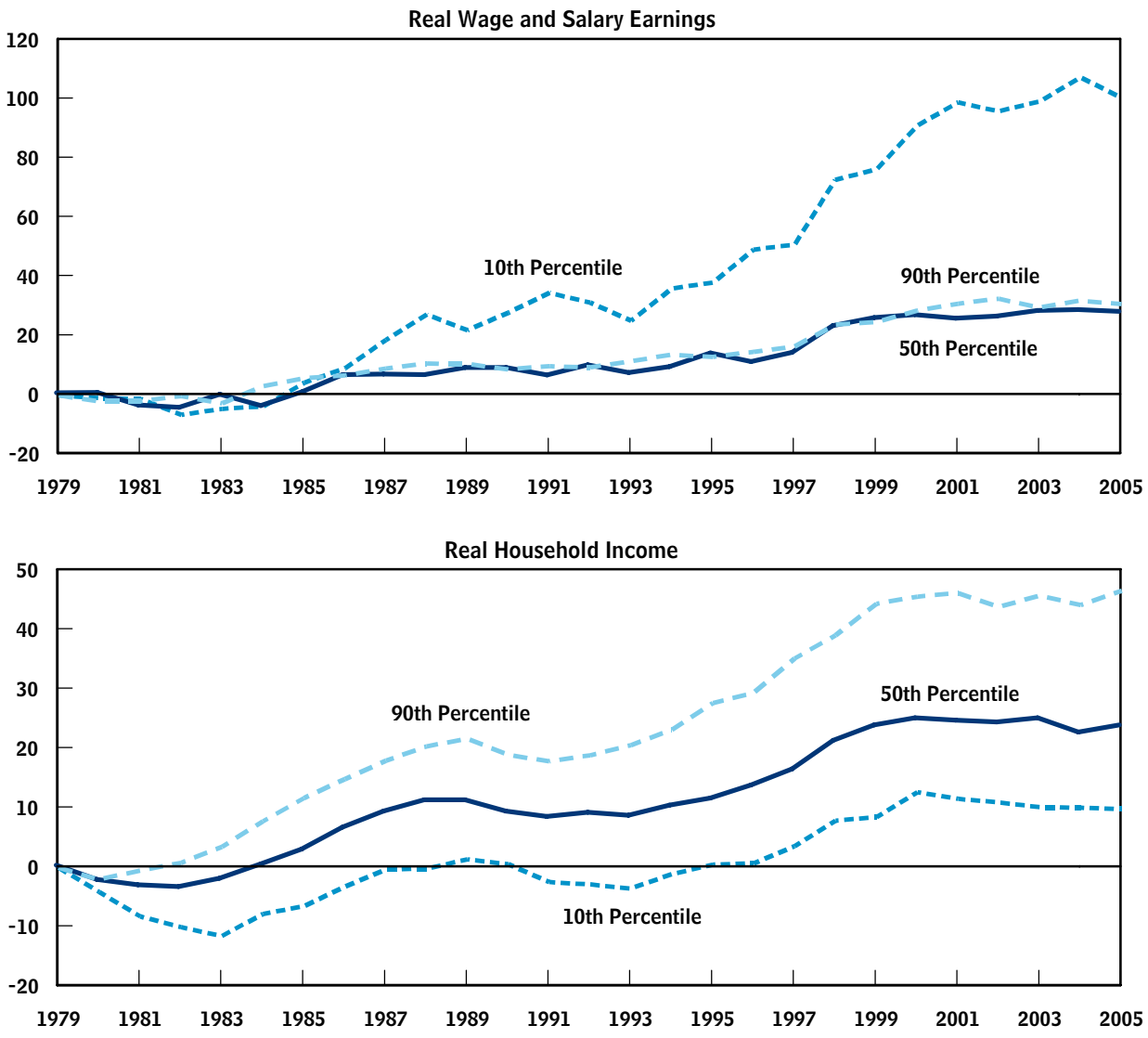
3. Household income is adjusted for household size using the poverty guidelines issued by the Department of Health and Human Services.

Box 2.

Continued

Percentage Growth in Annual Real Wage and Salary Earnings and in Real Household Income

(Percent)



Source: Congressional Budget Office based on the Bureau of the Census's Current Population Surveys from 1980 to 2006.

Note: Annual wage and salary earnings and annual household income are adjusted for inflation using the research series of the consumer price index for all urban consumers (CPI-U-RS). Annual household income is adjusted for household size using the poverty guidelines from the Department of Health and Human Services.

composition of the workforce; the individual effects of education and sex had somewhat offsetting effects on the wage distribution. On the one hand, the effect of an increase in the education level of the workforce alone would have led to a 3.5 percent widening of the bottom half of the wage distribution, mostly because there was more dispersion in the wages of more educated workers. On the other hand, the effect of an increasing female share of the workforce alone would have reduced the ratio of the median to the 10th percentile of real hourly wage rates by 1.9 percent, primarily because there was less wage dispersion among women than among men.

Between 1990 and 2005, compositional changes alone would have led to a slight (1.0 percent) widening of the bottom half of the wage distribution in contrast to the slight (2.4 percent) narrowing of the wage distribution that actually occurred.

Differences in Median Wages Paid to Groups of Workers. As with changes in the composition of the workforce, changes in the differences in the median wages among the 32 groups of workers defined by education, age, and sex would have somewhat increased the dispersion in wages during both the 1979–1990 period and the 1990–2005 period. In particular, changes in the differences in typical wages among the 32 groups can account for 2.2 percentage points of the 12.4 percent increase in wage dispersion between 1979 and 1990. During the period, there were growing differences in median wages between college graduates and workers with less education, although those differences were muted by a decrease in the difference in median wages between men and women.

Differential changes in median wages among groups would have led to a 0.7 percent increase in the ratio of the median to the 10th percentile of real hourly wage rates between 1990 and 2005. The difference between the median wages of men and women continued to narrow during the period, while the differences between the median wages of college graduates and those with less education continued to widen.

Researchers generally conclude that the rising wages of college graduates relative to high school graduates are due to increasing demand for skilled workers that more than offset the increasing share of workers with college degrees. Researchers have hypothesized that the increasing demand has been driven by new technologies that enhance the productivity of high-skill workers more than that of low-skill workers, an effect called skill-biased technological change (SBTC). Research indicates that steady SBTC moderated by growth in the number of college graduates in the labor force could largely account for differences in earnings between groups defined by educational attainment and labor market experience.[10]

Efforts to develop an empirical measure of SBTC have been less successful.[11] Some research has used the association between the frequency of computer use at work and changes in wage distribution to support the idea that SBTC accounts for the changes.[12] More-recent research provides evidence that as the ratio of physical to human capital increases, the return to skill increases, and that the increase in that ratio can explain the variation in the level of wages and the return to skill.[13] The association between wages on the one hand and availability of physical and human capital on the other is consistent with the view that a major new technology, the personal computer, became available to employers in the late 1970s followed by its gradual, widespread adoption in workplaces.

Review of the Research Literature on Changes in the Wage Distribution

Many researchers have sought to identify the causes of changes in the wage distribution. Some have focused on market forces, such as the demand for skill just discussed or increasing international trade; others have focused on institutional factors such as the decline of union member-

10. Those studies are surveyed in Lawrence F. Katz and Kevin M. Murphy, "Change in Relative Wages: 1963–1987: Supply and Demand Factors," *Quarterly Journal of Economics,* vol. 107, no. 1 (1992), pp. 35–78; and David F. Autor, Lawrence F. Katz, and Melissa Kearney, *Trends in U.S. Wage Inequality: Reassessing the Revisionists*, Working Paper No. 11627 (Cambridge, Mass.: National Bureau of Economic Research, September, 2005).

11. For a critique of the literature, see David Card and John DiNardo, "The Impact of Technological Change on Low-Wage Workers: A Review," National Poverty Center Working Paper Series, No. 05-28 (November 2005).

12. Alan Krueger, "How Computers Have Changed the Wage Structure: Evidence from Microdata, 1984–1989," *Quarterly Journal of Economics*, vol. 108, no. 1 (1993), pp. 33–60; and Christopher H. Wheeler, "Evidence of Wage Inequality, Worker Education, and Technology," *Federal Reserve Bank of St. Louis Review*, vol. 87, no. 3 (May–June 2005), pp. 375–393.

13. Paul Beaudry and David A. Green, "Changes in U.S. Wages, 1976–2000: Ongoing Skill Bias or Major Technological Change," *Journal of Labor Economics*, vol. 23, no. 3 (2005), pp. 609–648.

ship and changes in the level of the real federal minimum wage.[14]

That body of research presents no single cause for the changes in the wage distribution—the patterns are too disparate. If increased employer demand for educated workers, perhaps due to technological change, were the sole explanation, one might have expected to observe increases in the differences between education groups and in the dispersion within groups in both the 1980s and the 1990s. By contrast, within the 32 groups categorized by education, age, and sex, the dispersion in wages below the median increased during the 1980s and decreased somewhat afterward, while the differences in median wages widened between education groups and narrowed between gender groups over the entire 1979–2005 period.[15]

Although most researchers interpret variations in within-group wage dispersion as resulting from changes in employer demand for workers' skills distinct from education or experience, they also acknowledge the possibility that such variations arise from changes in the supply of those skills.[16]

Institutional factors may also have influenced the distribution of wages but, if so, their effects were probably limited to the 1980s. For example, some research has linked the widening bottom half of the wage distribution to declines in the real value of the federal minimum wage in the early 1980s.[17] High rates of inflation at that time effectively reduced the real level of the minimum wage and may have allowed real wages at the 10th percentile to fall, leading to greater differences between the 10th percentile and median wages.[18] Moreover, a declining real value of the minimum wage may have led to increases in the number of low-wage jobs and thus widened the wage distribution.

However, the declining real value of the minimum wage works less well in explaining movements in the 10th percentile of wages between the mid-1980s and 2005, as the federal minimum wage had declined to real levels well below the 10th percentile.

Research has found that labor unions tend to increase the hourly wage rates of low-skill and less-educated workers, though that tendency alone may or may not lead to reduced dispersion in hourly wage rates depending upon the extent to which unionization shifts employment toward sectors not covered by union contracts and the extent to which unionization reduces overall employment.[19] Many economic studies have found that unions have in fact reduced wage dispersion, and, in particular, some have suggested that the decline in unionization during the 1980s may have contributed to increased wage dispersion then.[20]

The Characteristics of Low-Wage Jobs and of Workers in Those Jobs

Thus far, this paper has documented the variation in the bottom half of the wage distribution and determined that only a small amount of it can be explained by changes in the education, age, and sex composition of the workforce. Most of the variation is instead the result of changes in the within-group distribution of wages.

14. Those studies are surveyed in Katz and Autor, "Changes in the Wage Structure and Earnings Inequality."

15. Autor, Katz, and Kearney, "Trends in U.S. Wage Inequality."

16. See Katz and Murphy, "Change in Relative Wages: 1963–1987"; and Juhn, Murphy, and Pierce, "Wage Inequality and the Rise in Returns to Skill."

17. David Lee, "Wage Inequality in the United States During the 1980s: Rising Dispersion or Falling Minimum Wage," *Quarterly Journal of Economics*, vol. 114, no. 3 (1999), pp. 977–1023; and Card and DiNardo, "Skill-Biased Technological Change and Rising Wage Inequality."

18. In 1979, the real value of the minimum wage was $7.20, less than $0.25 below the 10th percentile of hourly wage rates that year. By 1990, the real value of the minimum wage had fallen to $5.07, well below the 10th percentile of hourly wage rates, which was $6.60.

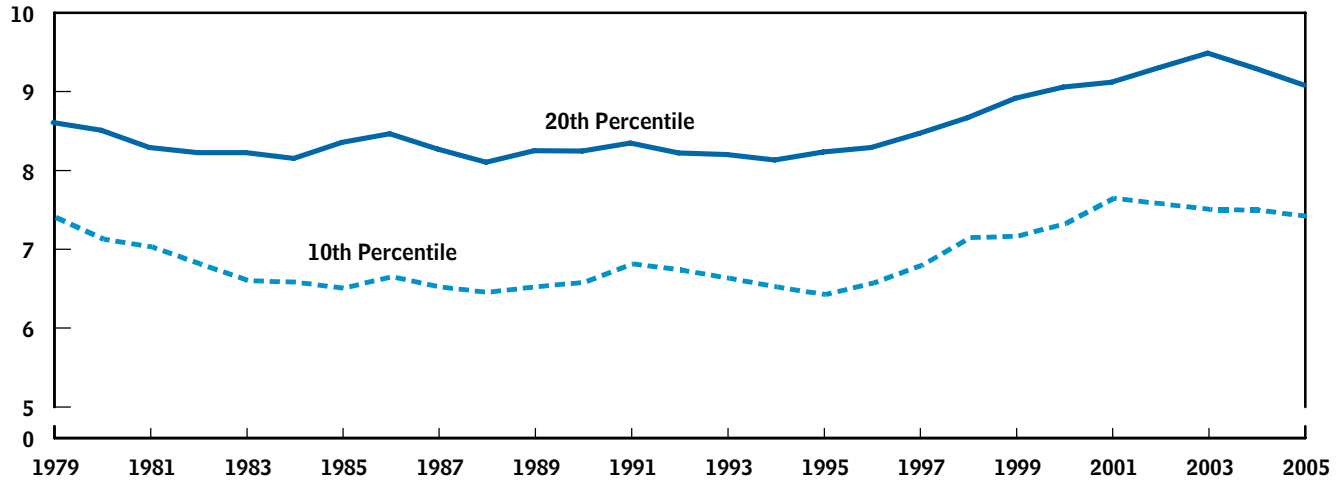
19. H. Gregg Lewis, *Union Relative Wage Effects* (Chicago: University of Chicago Press, 1986); David Card, "The Effect of Unions on the Structure of Wages," *Econometrica,* vol. 64, no. 4 (1996), pp. 957–979; and David Blanchflower and Alex Bryson, "What Effects Do Unions Have on Wages Now and Would Freeman and Medoff Be Surprised?" *Journal of Labor Research*, vol. 25, no. 3 (2004), pp. 383–414.

20. See, for example, David Card, "The Effect of Unions on Wage Inequality in the U.S. Labor Market," *Industrial and Labor Relations Review,* vol. 54, no. 2 (2001), pp. 296–315; and John DiNardo, Nicole Fortin, and Thomas Lemieux, "Labor Market Institutions and the Distribution of Wages, 1973–1992: A Semiparametric Approach," *Econometrica,* vol. 63, no. 5 (1996), pp. 1001–1044.

Figure 4.

Hourly Wages at the 10th and the 20th Percentiles, 1979 to 2005

(2005 dollars)



Source: Congressional Budget Office based on the Census Bureau's Current Population Surveys from 1979 to 2005.

Note: Hourly wages were adjusted for inflation using the research series for the consumer price index for all urban consumers (CPI-U-RS).

If changes in the composition of the workforce provide little explanation for the changing wage distribution, what other changes in the low-wage labor market might be responsible? The answer to that question may lie in changes in the characteristics of both low-wage jobs and the workers in those jobs during the period under consideration.

For this portion of the analysis, low-wage jobs are identified as those paying wages in the bottom 20 percent of the wage distribution. In 2005, the 20th percentile of hourly wages was roughly $9.00 and the 10th percentile was about $7.50 (see Figure 4).

Characteristics of Low-Wage Jobs

An understanding of the characteristics of low-wage jobs can help explain why they generally pay low wages. The level of compensation in a job is determined by a combination of factors, including, most importantly, the market value of the additional products and services firms can sell through the employment of an additional worker, and the number of people available and able to take the job. Other factors can matter as well. They include how difficult it is for firms to pass on higher wage costs to the consumers of their products, how large a share of total production costs workers represent, and how easy it is to substitute a worker with either machinery or a different type of worker. Institutional factors such as occupational certification and perhaps labor unions that limit the supply of workers to an occupation can lead to higher wage levels in that occupation. Finally, in addition to those extrinsic factors, jobs that pay low wages typically entail manual or other routine work and little supervisory or decisionmaking authority.

A substantial fraction of jobs characterized by those criteria are found in a small number of sectors and in a small number of occupations. In 2005, 42 percent of low-wage work was with employers in six sectors: food service and drinking places, agriculture, private households, personal and laundry services, accommodation, and retail trade.[21] By contrast, only 10 percent of work paying above-median wages was in those six sectors. Jobs in food preparation and serving occupations accounted for 16 percent of low-wage work in 2005, compared with 4 percent of work compensated at wages between the 20th and 50th percentiles and less than 1 percent of work paying above-

21. Those sector designations are from the Census Bureau's 2002 occupational and industry classification systems, which the Current Population Survey adopted in January 2003. Information about the sectors and the occupations they covered is available at www.census.gov.

median wages (see Table 3).[22] Jobs in building and grounds cleaning and maintenance; personal care and service;[23] health care support; farming, fishing, and forestry; and sales and related occupations also accounted for a substantial portion of low-wage work. In 2005, those six occupational groups made up 51 percent of low-wage work, compared to 25 percent of work paying wages between the 20th and 50th percentiles.

While some occupations saw increases and others decreases, the overall share of work in occupations with a large share of low-wage work remained relatively unchanged between 1983 and 2002 (see Table 4).[24] Low-wage jobs among administrative support staff, personal service providers, and motor vehicle operators gained shares, while low-wage jobs among machine operators and farm workers lost shares. Overall, the share of low-wage work in the 10 occupations that employed the largest shares of low-wage work was 64.3 percent in 2002, down only slightly from 65.6 percent in 1983.

Low-wage work is relatively more likely to be part time (defined by the Bureau of Labor Statistics as less than 35 hours per week). In 2005, 24 percent of low-wage work was part time compared with 8 percent of work paying slightly higher wages (see Table 3).[25] Some part-time jobs may pay lower wages because they impose greater per-hour costs on employers. For example, fixed costs, such as training costs, will be spread out over fewer hours for part-time work, which may lead employers to compensate by paying part-time workers less per hour.[26]

Survey data indicate that most part-time work is selected by the employee for noneconomic reasons rather than because of a lack of full-time employment opportunities.[27] And workers who prefer part-time jobs or jobs with flexible hours are more likely to be willing to accept lower wages in exchange for that flexibility.

Almost 80 percent of low-wage jobs are paid on an hourly basis, compared with less than 40 percent of jobs paying above-median wages.[28] One explanation for that relationship is that less well compensated workers may require more monitoring, and paying employees on an hourly basis is one way employers monitor them.[29]

Characteristics of Workers in Low-Wage Jobs

The characteristics, including skill levels, of workers in low-wage jobs can help explain why some workers receive low wages. Three observable characteristics of workers are often used as an indication of their skills: educational attainment, age, and nativity, while another, sex, is associated with wage levels.

- Educational attainment is associated both with the ability to learn job skills and with specialized knowledge acquired in school, and workers with little education are often in low-wage jobs. For example, in 2005, 51 percent of those with less than a high school degree were in low-wage work (see Table 5).

- Age is associated with work experience and the skills that come with that experience; thus, young workers, who are likely to have less experience, tend to earn lower wages. In 2005, 53 percent of all workers between the ages of 16 and 24 earned low wages.

22. Some workers paid wages in the bottom 20 percent of the wage distribution may receive tip income in addition to their base hourly wage. In the Current Population Survey, tip income is not included in the hourly wage rates of hourly workers but is included in the hourly wage rates of nonhourly workers. But the analysis is unlikely to be affected by missing tip income. In particular, if all subminimum wages were raised to the minimum wage or if the hourly wage rates of workers in food service reporting a wage below the federal minimum were doubled, neither the 10th percentile nor the median hourly wage rates would change.

23. Personal care and service occupations include barbers, hairdressers, child care workers, and recreation and fitness workers.

24. Those are the first and last years for which a consistent definition of occupations is available. Noncomparable occupation classifications were used before and after those years.

25. All statistics are weighted by weekly hours. The percentage of low-wage jobs that are part time, weighted by workers, is 35 percent, compared with 17 percent of all jobs.

26. See Yorem Barzel, "The Determination of Daily Hours and Wages," *Quarterly Journal of Economics,* vol. 87, no. 2 (1973), pp. 220–238.

27. In 2005, 86 percent of part-time work was selected for noneconomic reasons.

28. The percentage of low-wage jobs paid on an hourly basis is weighted by weekly hours. The figure is 83 percent when weighted by the number of workers.

29. See James B. Rebitzer, "Is There a Trade-Off Between Supervision and Wages?" *Journal of Economic Behavior and Organization,* vol. 28, no. 1 (1995), pp. 107–129.

Table 3.

Characteristics of Work, by Level of Hourly Wages, 2005

(Percent)

	Level of Hourly Wages		
	Less Than the 20th Percentile ($9.07)	Between the 20th Percentile and the Median (Between $9.07 and $14.82)	More than the Median ($14.82)
Part-Time	24.2	8.0	3.7
Paid Hourly	78.8	71.9	38.0
Government Agency	9.5	13.9	20.4
Union[a]	6.4	11.4	19.1
Low Hourly Wages			
Less than $5.15[b]	10.0	n.a.	n.a.
$5.15 to $6.14	11.7	n.a.	n.a.
$6.15 to $7.14	22.0	n.a.	n.a.
$7.15 to $8.14	29.9	n.a.	n.a.
$8.15 to $9.07	26.3	n.a.	n.a.
Total, Low Hourly Wages	100.0	n.a.	n.a.
Selected Occupations[c]			
Food preparation and serving	15.9	4.1	0.7
Building and grounds cleaning and maintenance	7.5	4.1	1.1
Personal care and service	5.6	2.5	0.8
Health care support	4.0	3.5	0.6
Farming, fishing, and forestry	2.4	0.7	0.1
Sales and related occupations	15.2	9.6	8.9
Total, Selected Occupations	50.6	24.5	12.2
Selected Sectors[c]			
Food services and drinking places	15.5	3.9	1.3
Agriculture	2.3	0.8	0.2
Private households	1.3	0.5	0.1
Personal and laundry services	2.1	1.1	0.5
Accommodation	2.4	1.3	0.6
Retail trade	18.6	12.7	7.4
Total, Selected Sectors	42.2	20.3	10.1

Source: Congressional Budget Office based on data from the Bureau of the Census's Current Population Survey, 2005.

Note: n.a. = not applicable.

a. Jobs that require union membership or are covered by union contracts.

b. Of the jobs in this category, 40 percent are in food preparation and serving, and workers may receive additional tip income. Forty-four percent are not paid on an hourly basis, and the low rate of pay may stem from jobholders' working a large number of hours.

c. These occupations and sectors have the highest concentration of low-wage work. That is, they rank highest in terms of the percentage of their workers who are paid low wages.

Table 4.

Distribution of Work Among Occupational Groups by Level of Wages, Selected Years from 1983 to 2002

Occupational Group	Percentage of Work Paid Low Hourly Wages[a]						Percentage of All Work			Percentage of All Work in Group That Is Paid Low Hourly Wages[a]		
	1983		1992		2002							
	Percent	Rank[b]	Percent	Rank[b]	Percent	Rank[b]	1983	1992	2002	1983	1992	2002
Food Service	14.6	1	14.4	1	15.0	1	4.2	4.2	4.3	70	70	69
Sales Workers, Retail and Personal Service	12.5	2	12.4	2	12.0	2	4.5	4.4	4.4	55	57	55
Other Administrative Support, Including Clerical	7.0	4	7.7	3	8.1	3	7.4	8.6	8.4	19	18	19
Machine Operators and Tenders, Excluding Precision	7.4	3	6.7	4	4.5	5	6.1	4.8	3.4	24	28	26
Cleaning and Building Service	5.4	6	5.4	5	5.0	4	2.6	2.5	2.2	41	44	44
Farm Workers and Related Occupations	5.4	5	5.0	6	4.2	7	1.8	1.7	1.5	60	60	55
Other Handlers, Equipment Cleaners, Helpers, and Laborers	3.8	9	3.8	7	3.9	8	2.2	2.0	1.9	34	39	42
Health Service	3.8	8	3.6	9	4.3	6	1.8	1.9	2.1	42	40	41
Personal Service	3.0	10	3.7	8	3.9	9	1.1	1.4	1.5	55	54	51
Motor Vehicle Operators	2.8	13	3.5	10	3.4	10	3.3	3.5	3.5	17	20	19
Total	**65.6**	**n.a.**	**66.2**	**n.a.**	**64.3**	**n.a.**	**34.9**	**34.9**	**33.2**	**n.a.**	**n.a.**	**n.a.**

Source: Congressional Budget Office based on the Bureau of the Census's Current Population Surveys.

Notes: Occupational groups are listed in descending order of the percentage of low-wage work in the occupation in 1983, 1990, 1992, 1994, 1997, and 2002 combined. The years 1983 and 2002 are the first and last years that the 1980 occupational classification was used in the Current Population Survey. (This occupational classification system differs from that in Table 3.)

n.a. = not applicable.

a. Paid less than the 20th percentile hourly wage.

b. Rank among 45 occupational groups.

- Some people, especially women and students, may prefer jobs that offer the greater flexibility of a part-time schedule or are close to home. In 2005, 24 percent of work by women was low-wage work (which by the definition adopted in this analysis is 20 percent of all work), while 68 percent of work by students between the ages of 16 and 24 was low-wage work.[30]

- In 2005, 30 percent of work by people born outside the United States was low-wage work. However, 44 percent of work by people born in Mexico or Central America was low-wage work. Two factors directly affect foreign-born workers' wage levels: those workers are less likely to speak English fluently, and the education they received in their home country may be less relevant in the U.S. labor market. In addition, foreign-born workers' employment opportunities are likely to be limited if they are not legally authorized to work.[31] However, the number of years in the United States is

30. See June O'Neill, "The Gender Gap in Wages Circa 2000," *American Economic Review*, vol. 93, no. 2 (May 2003), pp. 309–314; June O'Neill, "The Trend in the Male-Female Wage Gap in the United States," *Journal of Labor Economics,* vol. 3, no. 1 (1985), pp. 91–116; Mark Montgomery and James Cosgrove, "Are Part-Time Women Paid Less? A Model with Firm-Specific Effects," *Economic Inquiry*, vol. 33, no. 1 (1995), pp. 119–133; and Christy Spivey, "Time Off at What Price? The Effects of Career Interruptions on Earnings," *Industrial and Labor Relations Review,* vol. 59, no. 1 (2005), pp. 119–140.

31. While the legal status of foreign-born workers is not available in the data, their citizenship is. In 2005, 34 percent of noncitizens were paid low wages compared with 16 percent of naturalized citizens. The median wage among noncitizens in the United States for more than five years was $10.92, compared with $15.27 among naturalized citizens.

Table 5.

Share of Workers with Selected Characteristics by Level of Hourly Wages, Selected Years from 1979 to 2005

(Percent)

	1979	1985	1990	1994	2000	2005
	Share of Workers Who Are Paid Low Hourly Wages[a]					
Educational Attainment						
Less than high school	38	31	31	28	30	27
Less than 9th grade	14	11	11	9	10	9
High school diploma or equivalent only	38	40	40	38	37	36
Age and School Status						
Ages 16 to 24	44	42	38	36	33	33
Enrolled in school	n.a.	10	10	11	11	11
Sex—Female	62	59	57	55	56	54
Nativity						
Foreign born	n.a.	n.a.	n.a.	15	21	23
Born in Mexico or Central America	n.a.	n.a.	n.a.	9	12	13
	Share of All Workers					
Educational Attainment						
Less than high school	22	16	14	12	12	11
Less than 9th grade	8	6	5	3	4	3
High school diploma or equivalent only	38	38	36	33	31	30
Age and School Status						
Ages 16 to 24	22	18	16	14	14	13
Enrolled in school	n.a.	3	3	3	3	3
Sex—Female	40	42	44	44	45	45
Nativity						
Foreign born	n.a.	n.a.	n.a.	10	14	15
Born in Mexico or Central America	n.a.	n.a.	n.a.	4	5	6
	Share of All Workers with Characteristic Who Are Paid Low Hourly Wages[a]					
Educational Attainment						
Less than high school	35	39	44	48	51	51
Less than 9th grade	34	38	45	50	53	51
High school diploma or equivalent only	20	22	22	23	23	24
Age and School Status						
Ages 16 to 24	39	46	47	51	49	53
Enrolled in school	n.a.	67	67	70	66	68
Sex—Female	32	28	26	25	25	24
Nativity						
Foreign born	n.a.	n.a.	n.a.	31	31	30
Born in Mexico or Central America	n.a.	n.a.	n.a.	49	48	44

Source: Congressional Budget Office based on data from the Bureau of the Census's Current Population Surveys for selected years from 1979 to 2005.

Note: n.a. = not applicable.

a. Paid less than the 20th percentile hourly wage.

also strongly associated with wage levels for foreign-born workers: those who have been in the United States for five years or less are much more likely to be in low-wage jobs than those who have been in the United States longer.

The composition of the low-wage workforce changed between 1979 and 2005 but not always in proportion to the changes in the workforce as a whole. For example, the percentage of low-wage work done by individuals who had not completed high school declined by almost one-third (from 38 percent in 1979 to 27 percent in 2005). However, over the same period, the percentage of all work by that group fell by one-half (from 22 percent in 1979 to 11 percent in 2005). Thus, in 2005 a worker who had not completed high school was more likely to be in a low-wage job than a comparable worker in 1979.

Similarly, the percentage of low-wage work conducted by young workers declined substantially as the workforce aged but by less than their share of the workforce as a whole: while the percentage of low-wage work for such workers declined by only about 25 percent, the percentage of all work done by 16- to 24-year-olds declined by almost 50 percent between 1979 and 2005. The share of low-wage work conducted by young students did not change over the period, while the share conducted by young nonstudents fell by half.[32]

Among women, the pattern has been different from the patterns among the young and the less educated. Between 1979 and 2005, the share of all work conducted by women increased by 13 percent (from 40 percent in 1979 to 45 percent in 2005), but women's share of low-wage work decreased by 13 percent (from 62 percent in 1979 to 54 percent in 2005). Thus, a woman in 2005 was substantially less likely to be in a low-wage job than a woman in 1979.

Foreign-born workers' share of low-wage jobs also increased (see Box 3 on page 22). Since 1994, the first year for which data for such workers are available, the percentage of low-wage work conducted by foreign-born workers increased by 50 percent, the same as the increase in their share of all work. Foreign-born workers as a whole are now no more likely to be in low-wage jobs than they were in 1994.

32. See Congressional Budget Office, *What Is Happening to Youth Employment Rates?* (November 2004).

The Household Income of Workers in Low-Wage Jobs

The fact that the 10th percentile of inflation-adjusted hourly wage rates is roughly the same today as it was in 1979—about $7.50 per hour—raises the question of whether the economic resources available to workers earning low wages have changed over time. This section addresses the question by examining trends in the household income of low-wage earners (those earning wages in the bottom 20 percent of the wage distribution), the sources of that income, and how the income has changed over the past 25 years.

Household income depends not only on a worker's hourly wage rate but also on the number of hours worked, the number and earnings of other workers in the household, and other sources of cash income.[33]

The median pretax household income of workers who earned an hourly wage below the 20th percentile remained relatively stable, declining by only about 2 percent (from $41,166 in 1979 to $40,156 in 2005) (see Table 6). By contrast, the household income of workers who earned wages between the 20th and 50th percentiles increased by 6 percent (from $48,191 in 1979 to $51,032 in 2005).

There are countervailing factors behind the virtually unchanged level of household income among workers who earn low hourly wage rates. On the one hand, real annual earnings among low-wage earners increased substantially (by 64 percent) between 1979 and 2005, primarily because the number of hours worked in 2005 was much higher than in 1979. The median number of hours worked by low-wage earners in 2005 was roughly 1,600, up from about 1,000 in 1979.[34] On the other hand,

33. The measure of cash income considered here is pretax cash income (including cash transfers such as welfare benefits). Noncash benefits, such as employer-sponsored health insurance; in-kind government assistance (such as food stamps); and the treatment of income in the tax system, including benefits derived from the earned income tax credit, are not considered.

34. One reason the hours worked per year were so much higher among low-wage earners in 2005 than in 1979 is that there were fewer young people among those workers in 2005. Young people typically do not work as many hours per year as older workers earning low wages (roughly 1,020 versus 1,920 in 2005). Nevertheless, the number of hours worked among both young and older workers in low-wage jobs was higher in 2005 than in 1979 (among older workers it was up from 1,400, for example).

earnings from other workers in the household declined. The median total real earnings of other adult workers in the household were $23,000 in 2005, down 8 percent from $24,900 in 1979.[35]

Other changes further offset the income gains that resulted from the increased hours worked. The number of other workers in the households of low-wage earners was substantially lower in 2005 than it had been for their counterparts in 1979; in 2005, that number averaged 1.2, down 11 percent from 1979.[36] Furthermore, an increasing percentage of low-wage earners were either the sole or primary wage earner in their household. In 2005, 26 percent of those workers were the only earner in their household, up from 22 percent in 1979, and 34 percent accounted for the majority of the earnings in the household, up from 30 percent in 1979.

Not only were total household earnings among low-wage earners slightly lower in 2005 than they had been in 1979, but other "unearned" sources of household cash income, such as cash assistance and unemployment insurance, were also lower. The median amount of unearned household income in 2005 was about $900 among workers in low-wage jobs—less than half of what it was in 1979 after adjusting for inflation.

Thus, although, on average, low-wage earners worked many more hours in 2005 than their counterparts did in 1979, the median income in their households was somewhat lower. Decreases in both the number of other earners in the household and in other unearned income contributed to that decline.

35. The average earnings from other workers increased, but the increase in the average was due to a relatively small percentage of households with a high level of earnings from other workers. The 90th percentile of earnings from other workers was $92,000 in 2005, up from $81,000 in 1979. Other percentiles in 2005—the 25th, 50th, and 75th—were either down from their levels in 1979 or up only slightly.

36. The decline in the number of adult workers did not correspond to an increase in the number of nonworking adults in the household; rather, the total number of adults in those households declined.

Table 6.

Real Household Income and Its Sources for Workers Age 16 and Older, by Level of Hourly Wages, Selected Years from 1979 to 2005

	1979	1990	2005
	Workers Whose Hourly Wages Are Below the 20th Percentile ($8.18 in 2005)		
Median Pretax Household Income[a] (Dollars)	41,166	37,436	40,156
Median Annual Earnings (Dollars)	4,887	5,659	8,011
Median Annual Hours Worked	1,040	1,225	1,560
Earning Status in Household (Percent)			
Sole earner	22	24	26
Majority earner	30	33	34
Other Workers in Household			
Average number	1.35	1.26	1.20
Median total earnings (Dollars)	24,947	20,750	23,032
Average Number of Nonworking Adults in Household	0.50	0.46	0.48
Median Total Nonearned Income[b] (Dollars)	2,076	2,383	861
	Workers Whose Hourly Wages Are Between the 20th Percentile and the Median (Between $8.18 and $14.46 in 2005)		
Median Pretax Household Income[a] (Dollars)	48,191	47,907	51,032
Median Annual Earnings (Dollars)	17,463	17,848	22,031
Median Annual Hours Worked	1,900	2,080	2,080
Earning Status in Household (Percent)			
Sole earner	24	25	30
Majority earner	42	45	48
Other Workers in Household			
Average number	1.21	1.14	1.02
Median total earnings (Dollars)	23,700	21,765	22,682
Average Number of Nonworking Adults in Household	0.42	0.37	0.42
Median Total Nonearned Income[b] (Dollars)	1,260	1,413	320

Source: Congressional Budget Office based on data from the Bureau of the Census's March Current Population Surveys for selected years from 1980 to 2006.

Notes: Wages and income are expressed in 2005 dollars based on the research series of the consumer price index for urban consumers.

The wage rate is calculated as earnings last year divided by hours worked last year. Hours worked last year is the product of weeks worked last year and usual hours worked per week. These measures differ from those used in Tables 1 through 5. This table is based on people surveyed in March 2006 and who worked at some point in the previous calendar year. The March survey is the source of data on household income and work during the previous calendar year. Tables 1 through 5 are based on people surveyed each month and who worked in the previous week. This March survey is more likely to capture people who work very little over the course of a year.

a. The medians of the components of household income do not add up to the median of household income. At the individual worker level, the components of income do add up to household income. Self-employment and farm income is a component of household income but has a median level of zero and so is not shown.

b. "Other nonearned sources of income" include cash benefits (such as welfare and capital income) but not in-kind benefits (for example, food stamps) or cash transfers through the federal tax system (such as the earned income tax credit).

Box 3.

The Recent Growth in the Number of Foreign-Born Workers and the Distribution of Hourly Wage Rates

The percentage of workers in the U.S. labor force who are foreign born has significantly increased over the past 25 years. In particular, between 1980 and 2005 the percentage from Mexico and Central America quadrupled from roughly 1.5 percent to 6 percent. Workers from those regions tend to have low levels of educational attainment—in 2005, half had not finished high school. Even after an adjustment for their low level of educational attainment, workers from those regions earn relatively low wages.[1] That wage difference may derive, in part, from their poorer English language skills. In 2005, half of workers from Mexico and Central America indicated that they did not speak English or did not speak English well.[2] Logically, the influx of immigrants with poor job skills who earn low wages could have contributed to the widening of the wage distribution during the 1980s and reduced the amount of narrowing afterward. But, the Congressional Budget Office's analysis suggests that, since 1994, the first year that data on the nativity of workers are available from the surveys used for this paper, the increases in the percentage of workers who are foreign born had little effect on the bottom half of the hourly wage distribution.

About 6 percent of workers in 2005 were foreign born and indicated that they immigrated to the United States in 1994 or later. Those workers tend to earn lower wages than those of foreign-born workers who have been in the United States longer and native-born workers. For example, in 2005 the median hourly wage of recent immigrants was $10.13, compared with $15.05 for native-born workers and foreign-born workers who came to the United States before 1994 (see the table to the right). Also, there was less dispersion in the bottom half of the distribution in the wages of recent immigrants: in 2005, the ratio of the 50th to 10th percentile wages was 1.53 compared with 2.00 for natives and earlier immigrants. Adding the new arrivals to those who were already here in 1994 had virtually no effect on bottom-half dispersion in the group. In 2005, the ratio of the 50th to 10th percentiles was 2.00 with recent immigrants excluded, compared with 1.99 with them included.

1. See Congressional Budget Office, *The Role of Immigrants in the U.S. Labor Market* (November 2005).

2. Foreign born workers who are not authorized to work but do so illegally are also likely to earn low wages.

Box 3.

Continued

Distribution of Hourly Wage Rates Among Workers, by Nativity and Year of Immigration, 2005

	Native-Born Workers and Foreign-Born Workers Who Arrived Before 1994	Foreign-Born Workers Who Arrived in 1994 or Later	All Workers
Number of Workers (Millions)	117.7	7.7	125.4
Percentiles (Wages in 2005 dollars)			
10th	7.53	6.62	7.44
20th	9.34	7.46	9.07
50th	15.05	10.13	14.82
Ratio of 50th to 10th Percentile Wages	2.00	1.53	1.99

Source: Congressional Budget Office based on data from the Bureau of the Census's Current Population Survey, 2005.

Notes: Respondents' year of immigration is the one they indicated as the time they first came to the United States to stay.

However, the presence of recent immigrants in the labor market might affect the wages of native-born workers and earlier immigrants, and the preceding comparison makes no allowance for that possibility. Some studies find a negligible effect of immigration on the wage distribution of workers already in the United States. On the basis of those findings, no allowance is necessary, and one would conclude that the arrival of immigrants since 1994 has had no effect on the dispersion of wages in the bottom half of the distribution.

Other studies, however, find that recent immigration has reduced the wages of low-wage workers significantly, particularly those who have not finished high school, and has had very small positive effects on the wages of existing workers paid higher wages. On the basis of those findings, one would conclude that the arrival of immigrants since 1994 widened the distribution of wages among earlier immigrants and native-born workers and, consequently, among all workers. The uncertainty about the impact of recent immigrants on the wages of other workers makes it difficult to conclude what the effect of the influx of immigrants has been on dispersion in the lower half of the wage distribution.

Appendix: Accounting for the Sources of Changes in the Distribution of Wages

The Congressional Budget Office's (CBO's) analysis breaks down the sources of variation in wage dispersion in the bottom half of the wage distribution into three parts: (1) changes in the education, age, and sex of workers, or the compositional effect; (2) changes in the differences between the typical wages paid to groups of workers defined by education, age, and sex, or the between-group effect; and (3) changes in wage dispersion within groups of workers defined by education, age, and sex, or the within-group effect.[1]

The sample is made up of workers age 16 or older. Education in 1979 is measured as a categorical variable with four values: having completed less than 12 years of school, 12 years exactly, 13 to 15 years, and 16 years or more. Those categories are defined slightly differently in 1990 and 2005 because of changes in the survey: not having a high school diploma; having a high school diploma or the equivalent but not having attended college; having attended college but not having received a degree; and having at least a college degree. Age is also measured categorically: 16 to 24; 25 to 44; 45 to 64; and 65 and older. Observations are weighted by a person-weight variable and by the hours worked in the preceding week.

The workers in the sample were placed in one of 32 categories, defined by the four age and four education categories described above and by sex. For example, one of the 32 demographic categories is males, age 16 to 24, with less than a high school degree. For that category of worker, the analysis determines how much of the change in the overall wage distribution results from (1) the observed changes in the percentage of workers who are males, age 16 to 24, with less than a high school degree; (2) the changes in wages paid to those workers, relative to those for workers in other demographic groups; and (3) the changes in the dispersion of wages paid to workers in the group over time. The discussion in this paper is based on the aggregated contribution for all of the 32 demographic groups.

The data used for this analysis come from the Bureau of the Census, Current Population Survey, Outgoing Rotation Groups from 1979, 1990, and 2005. The years are chosen to match the analysis in the rest of the paper. Wages are inflated to 2005 dollars using the research series of the consumer price index for all urban consumers.

Workers' calculated hourly wage rates are either the reported hourly wage (for the 60 percent of workers paid on that basis) or weekly earnings divided by weekly hours (for the other 40 percent of workers). For the latter group, the usual earnings per week divided by the usual hours per week was generally used. When information on the usual hours per week was missing (in 2005, for example, the figures were missing for 5 percent of workers not paid on an hourly basis), the analysis used the number of actual hours worked in the previous week. While that procedure minimizes the number of workers excluded

1. The analysis implements a procedure that closely resembles that of David H. Autor, Lawrence F. Katz, and Melissa S. Kearney, *Rising Wage Inequality: The Role of Composition and Prices*, Working Paper No. 11628 (Cambridge, Mass.: National Bureau of Economic Research, September 2005). It extends the methods developed in Jose A.F. Machado and Jose Mata, "Counterfactual Decomposition of Changes in Wage Distributions Using Quantile Regression," *Journal of Applied Econometrics,* vol. 20, no. 4 (2005), pp. 445–465, to more closely resemble the decompositions developed by Chinhui Juhn, Kevin M. Murphy, and Brooks Pierce, "Wage Inequality and the Rise in Returns to Skill," *Journal of Political Economy,* vol. 101, no. 3 (1993), pp. 410–442. Other papers that conduct similar decompositions include Amanda Gosling, Stephen Machin, and Costas Meghir, "The Changing Distribution of Male Wages in the U.K.," *Review of Economic Studies,* vol. 67, no. 4 (2000), pp. 635–666.

from the analysis, it introduces some noise into the calculated hourly rate of pay because the actual hours worked last week may differ from usual hours worked per week. For 14 percent to 19 percent of workers not paid on an hourly basis, the number of actual hours worked the previous week was different from the usual hours per week. Most often, those workers indicated that they worked part time in the previous week for various reasons but usually worked full time.

Imputed data on hourly wage rates, usual weekly earnings, and usual hours worked per week were used in the analysis. In cases in which individuals did not provide complete responses to the Census Bureau interviewers, the bureau imputed the missing data using the information provided by a different respondent with some of the same characteristics, when those characteristics were likely to be associated with the missing data. For example, the earnings of a respondent with the same education, age, and occupation may have been used to fill in the missing information for a respondent who did not provide it. Over the years, the percentage of workers not providing earnings information has increased and was 31 percent in 2005.

For each year—1979, 1990, and 2005—CBO created a predicted hourly wage distribution by estimating quantile regressions at every other percentile from the second to the 98th percentiles (inclusive), where the natural logarithm of the hourly wage was the dependent variable and indicators for the 32 categories of workers (defined by age, education, and sex) were the controls.[2] That approach was used because parameterized distributions of wages for each year, which are functions of age, education, and sex, are needed to conduct a decomposition analysis. Using the estimates from each of the 49 models in each year, 49 predicted log wages were created for each observation in that year, resulting in 49 predicted log wages for each observation in the sample. The distribution of the set of predicted wages closely resembled the distribution of hourly wage rates in each year. Those predicted wage distributions were then used as the base against which to measure the effects of observed changes in the composition of the workforce.

2. For a discussion of the application of quantile regressions to conditional wage distributions, see Moshe Buchinsky, "Changes in the U.S. Wage Structure, 1963–1987: Application of Quantile Regression," *Econometrica*, vol. 62, no. 2 (March 1994), pp. 405–458.

The next step in the analysis was to determine how changes in the workforce composition, in the relative wages paid to the different demographic groups of workers, and in the wages within each demographic group of workers contributed to the changing wage distribution in the 1979–1990 and 1990–2005 periods.

To calculate the first part of the decomposition, the effect of the changing composition of the workforce on wage dispersion in the bottom half of the wage distribution, a counterfactual hourly wage distribution was created. In that counterfactual distribution, the age, education, and sex composition of the workforce was made identical to the composition in 1990 (for instance), but the 1979 models used to estimate each group's wages were used to generate predicted wages. That calculation captured what the wage distribution in 1979 would have been had the composition of the workforce in 1979 mimicked that in 1990, keeping the relative wages paid to each demographic group and the dispersion of wages within each demographic group as they were in 1979. Specifically, to create that counterfactual distribution, the analysis predicted 49 wages for each observation from 1990 using the estimates from the 49 models in 1979. The difference between the counterfactual 1979 distribution (with 1990 characteristics) and the actual 1979 distribution provided an estimate of how much of the change in the bottom half of the wage distribution between 1979 and 1990 resulted from changes in the composition of the workforce.

Three additional counterfactual wage distributions were created to further analyze changes in the composition of the workforce in terms of workers' education alone, age alone, and sex alone. (Those results are also reported in Table 2.) To create those distributions, the 1990 data were reweighted so that the distribution of education, for example, equaled the distribution of education in 1990 while the distributions of age and sex equaled the distributions in 1979.[3] That is, in the reweighted data, the probability that a worker has less than a high school edu-

3. The reweighting procedure used is "raking" or "iterative proportional fitting." See W. Edwards Deming and Frederick F. Stephan, "On a Least Squares Adjustment of a Sampled Frequency Table When the Expected Marginal Totals Are Known," *Annals of Mathematical Statistics,* vol. 11 (1940), pp. 427–444; W. Edwards Deming, *Statistical Adjustment of Data* (New York: John Wiley, 1943); or Jean-Claude Deville, Carl-Erik Sarndal, and Olivier Sautory, "Generalized Raking Procedures in Survey Sampling," *Journal of the American Statistical Association,* vol. 88, no. 423 (1993), pp. 1013–1019.

cation is equal to that in 1990, but the probability that a worker is male or is age 16 to 24 is equal to that in 1979. Those data were then used to predict 49 wages for each observation using the estimates from the 49 models in 1979. Again, the change between that counterfactual 1979 distribution (with 1990 characteristics in terms of education and a 1979 composition in terms of age and sex) and the actual 1979 distribution provided an estimate of how much of the change in the bottom half of the wage distribution between 1979 and 1990 resulted from changes in the educational attainment of the workforce alone. Note that the portion of the changes in dispersion in the bottom half of the wage distribution that are due to education alone, sex alone, and age alone necessarily sum to the portion of the changes in dispersion in the bottom half of the wage distribution that result from the combination of changes in the characteristics in terms of age, education, and sex.

To calculate the second part of the decomposition, the effect on dispersion from changes in relative wages among age-education-sex groups, another counterfactual distribution was created. That distribution reflected both the changing composition of the workforce by incorporating the age-education-sex characteristics of the workforce in 1990 and the differences in the typical wages received by each group of workers (defined by age, education, and sex). To create that distribution, the analysis adjusted the wage of every observation in the counterfactual 1979 distribution discussed above (with 1990 characteristics) by the percentage difference between the median wage of that observation's group in 1979 and 1990. Thus, that counterfactual distribution reflected the 1990 composition and 1990 between-group differences in median wages but retained the 1979 within-group wage dispersion. The difference between the counterfactual 1979 distribution (with 1990 between-group differences in typical wages and 1990 characteristics) and the counterfactual 1979 distribution (with 1990 characteristics) provided an estimate of how much of the change in the bottom half of the wage distribution between 1979 and 1990 resulted from changes in the between-group differences in median wages among groups of workers.

The third and final piece of the decomposition, that is, the portion of the change in wage dispersion resulting from changes in wage dispersion within each of the 32 demographic groups, was simply the remainder. The analysis shows that the results are not highly sensitive to the order of the decomposition (as has been the case with that done by other researchers).