Monthly Labor Review

BLS

July 2015

Compensation inequality: evidence from the National Compensation Survey

Using data from the National Compensation Survey, this article examines compensation inequality measures and trends over the 2007–2014 period. The analysis suggests that inequality measures based on total compensation (i.e., wages plus costs of employer-provided benefits) are higher than measures based solely on wages. It also points to an increase in inequality over the study period—an increase largely driven by a growing compensation gap between high- and low-earning occupations—and considerable intraoccupational inequality.

Kristen Monaco
monaco.kristen@bls.gov

Kristen Monaco is a research economist in the Office of Compensation and Working Conditions, U.S. Bureau of Labor Statistics.

Brooks Pierce
pierce.brooks@bls.gov

Brooks Pierce is a research economist in the Office of Compensation and Working Conditions, U.S. Bureau of Labor Statistics.

An eroding pay for low- and moderately skilled workers and pay gains for high earners have prompted a great deal of research on wage and income inequality. Much of this research has focused on wages, because detailed data on wages are readily available. However, roughly 30 percent of the average worker's total compensation comes from employer-provided benefits.[1] Hence, counting benefits as part of compensation is likely to give a truer measure of a worker's pay. Furthermore, not all workers receive equal benefits, and the distribution of benefits has likely changed over time. Using pay measures that incorporate the costs of employer-provided benefits, this article documents inequality growth between 2007 and 2014.[2]

The article is organized into five sections. The next section describes the data used in the analysis. The section that follows presents wage and compensation inequality measures for 2007 and 2014. The third and fourth sections offer an analysis of employer-provided benefits as a share of wages across the earnings distribution and a presentation of inequality measures by major occupational group. The final section summarizes the results.

Data

The National Compensation Survey (NCS) is an establishment survey used as the basis for the Employment Cost Index (ECI) and the Employer Costs for Employee Compensation (ECEC) estimates. These estimates are produced quarterly by the Bureau of Labor Statistics. Data are collected on wages, salaries, and a series of employer-provided benefits.

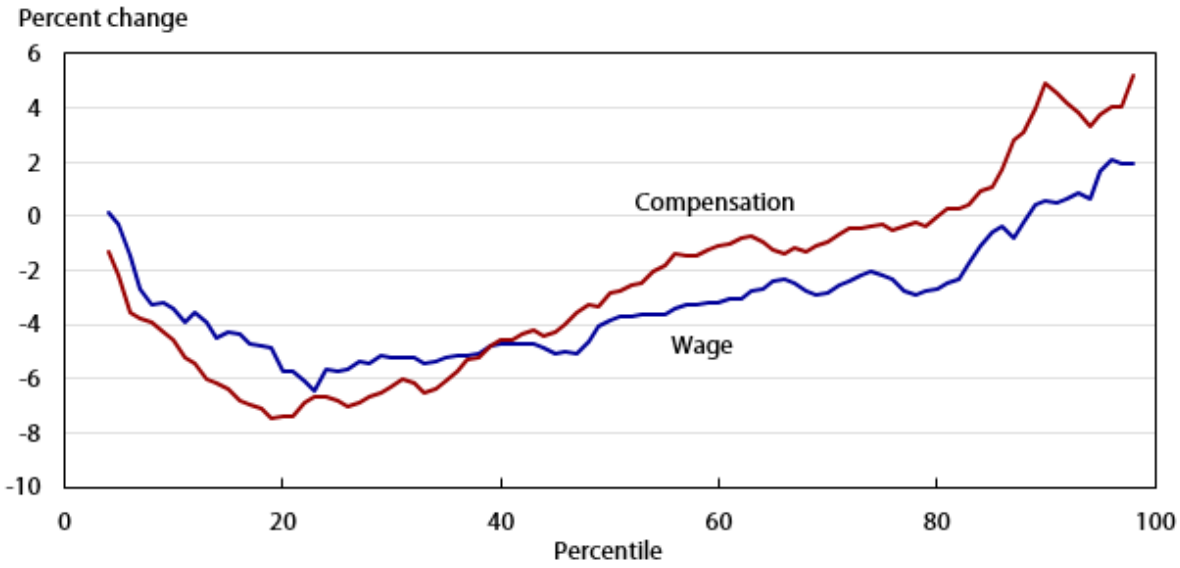
The NCS samples private sector and state and local government establishments with one or more workers. It excludes federal government, military, agricultural, and private household workers. Jobs within an establishment are sampled through a probability selection; for private industry establishments, the survey typically samples between four and eight jobs. The probability of a job being selected is proportional to employment in that job.[3] Jobs are coded into occupations (using six-digit codes based on the Standard Occupational Classification) and, for each job, data are collected on the components of compensation.

We use ECEC data from the third quarter of 2007 and the second quarter of 2014.[4] To measure costs in real rather than nominal terms, we convert wage and compensation cost data for 2007 to June 2014 levels with the use of the Consumer Price Index for All Urban Consumers. Although wages and salaries in the ECEC include only straight-time pay, our analysis includes other cash payments that might be considered part of wages and salaries: overtime pay, shift differentials, and nonproduction bonuses.[5] We calculate total compensation as the adjusted hourly wage[6] plus the hourly cost of employer-provided benefits, less legally required benefits (employer costs for Social Security and Medicare, state and federal unemployment insurance, and worker compensation insurance). The benefits included in our measures of compensation are health insurance, retirement and savings plans, paid leave, and disability and life insurance. Because the NCS captures employer costs, our benefit cost measures exclude employee contributions.

Measures of compensation inequality

What do ECEC data reveal about wage and compensation inequality? One way to document changes in wage inequality is to contrast wage growth for low- and high-wage jobs. If, for instance, wages in jobs with low to moderate pay have fallen and wages in jobs with high pay have risen, then wage inequality has gone up. To carry out this analysis, we calculate the percent change in real wages between 2007 and 2014 at different percentiles of the wage distribution. We calculate analogous estimates for total compensation growth at different percentiles of the compensation distribution.

Figure 1. Percent change in real compensation and wages for civilian workers, by percentile, 2007–2014

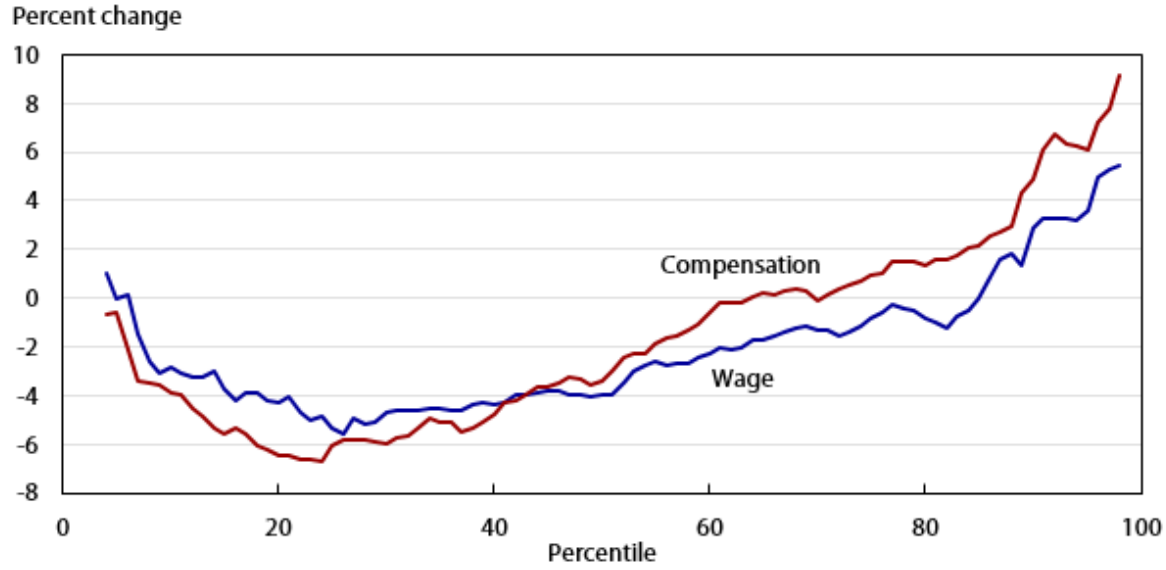


Source: U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation.

Figure 1 presents the percent change in real compensation and wages for civilian workers (i.e., private sector and state and local government workers). The vertical axis shows wage or compensation growth, and the horizontal axis indicates percentiles of the relevant distribution. For example, the percent change in wages at the 50th percentile is about –4 percent, which means that median real hourly wages fell approximately 4 percent over the 2007–2014 period. (Nominal median wages rose, but not enough to keep pace with inflation.)

The patterns of wage and compensation growth are roughly U-shaped, with real growth for both measures lying below zero for most of the range. At relatively high percentiles of the wage or compensation distributions, however, growth is positive. This picture of pay inequality lends support to other studies that find positive wage growth among highly paid jobs but wage stagnation among jobs with lower pay.[7] Beyond about the 25th percentile, the series plotted in figure 1 broadly slope up, which implies that inequality by either measure increased over the study period. Pay at the 90th percentile grew more in percent terms than did pay at the 75th percentile, which in turn grew more (fell less) than pay at the median, and so forth. The U-shaped patterns mean that inequality decreased within the bottom quartiles of the wage and compensation distributions.

Figure 2. Percent change in real compensation and wages for private industry workers, by percentile, 2007–2014



Source: U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation.

Figure 2 reproduces figure 1, but only for private sector workers, who generally have less generous employer-provided benefits than do state and local government workers. While the picture is similar to that for all workers, it shows percent changes in compensation close to 9 percent for the highest percentiles of the distribution.

Notable in figures 1 and 2 is that compensation growth lies below wage growth at lower percentiles and above wage growth at higher percentiles. In other words, compensation inequality grew faster than did wage inequality over the 2007–2014 period. This result is possible because the relationship between wages and total compensation is not constant across wage levels. Indeed, the series in figures 1 and 2 suggest substantial changes over time in how benefit costs vary by percentile. To examine these changes, the next section presents the relationship between wage and total compensation at different points in the distribution.

Employer-provided benefits as a share of pay

We calculate the share of employer-provided benefits as the ratio of a job's benefit costs (less legally required benefits) to the adjusted wage. For instance, a job might pay $10 an hour in direct cash wages and $1 an hour in benefits like paid leave or employer contributions to a retirement plan. Workers in such a job would have a benefits share of 10 percent ($1 in benefit costs divided by $10 in wages). In that case, one might think of the employer as paying a 10-percent benefit "add-on" to the wage.

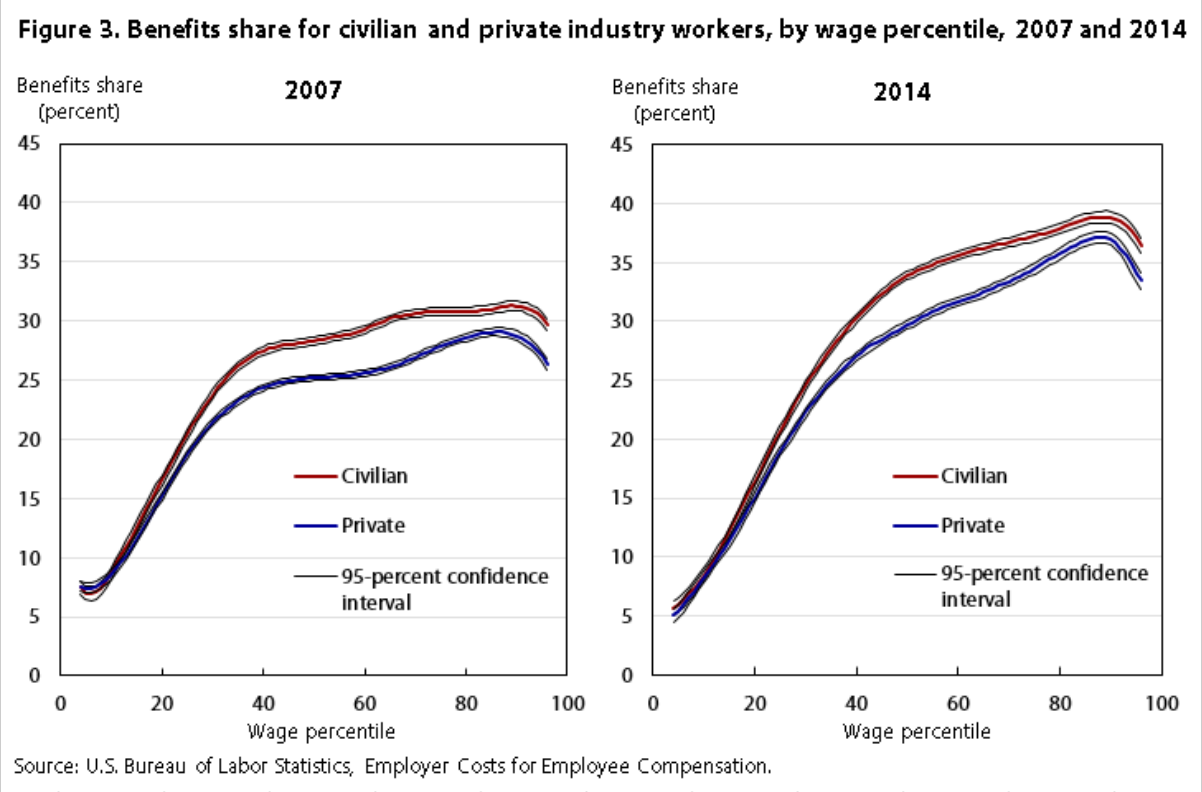


Figure 3 graphs the relationship between benefits shares and wage percentiles for all civilian and private industry workers. The left panel shows the relationship in 2007 and the right in 2014. The curves are smoothed to make the underlying patterns more apparent.[8] To facilitate comparison, 95-percent confidence intervals are also shown.

As seen in figure 3, from about the 20th percentile through the top end of the distribution (the 97th percentile in 2007 and the 95th percentile in 2014), the benefits share for private industry workers is lower than that for civilian workers. The gap illustrates that benefits for government workers are more costly than those for private industry workers.

While the relationship between wage percentiles and benefits shares is positive, it flattens substantially in the upper half of the distribution in 2007. For instance, for civilian workers in 2007, the benefits share is 12.5 percent at the 15th percentile and 26.1 percent at the 35th percentile, a difference of 13.6 percentage points. For the 70th and 90th percentiles (also an interval of 20 percentiles), the estimated shares are 31.3 and 30.6 percent, respectively, for a difference of 0.7 percentage points. The shape of the civilian profile is different in 2014, in that the benefits share peaks at higher wage percentiles. For example, at the 90th percentile, benefits were 31.3 percent of the adjusted wage in 2007 and 38.8 percent in 2014, a significant difference. Focusing on the graph for private sector workers, we find that the benefits share stays above 30 percent for almost the entire top half of the distribution in 2014 and below 30 percent in 2007. A rising benefits share at higher percentiles implies that benefits are rising more than proportionately with wages. By implication, inequality estimates are higher if pay is measured by total compensation.

There are two possible explanations for why the benefits share is higher in 2014 than in 2007 in the top half of the wage distribution. First, the difference may be due to stagnant or decreasing wages after the most recent recession—even if benefit costs remained the same, the benefits share would increase. Second, it is possible that the difference reflects a net increase in benefit costs at the high end of the distribution. Figures 1 and 2 support the

second explanation; however, a more adequate examination is one that looks at levels of wages and compensation, by benefit component.

We divide benefits into the following key components: paid leave (vacations, holidays, sick leave, and other leave), insurance (life, short-term disability, and long-term disability insurance), health insurance, and retirement and savings plans (defined benefit and defined contribution plans). Table 1 presents estimates of the levels of these benefits at three points in the wage distribution—the 10th percentile, the 50th percentile (the median), and the 90th percentile. The estimates are calculated as the weighted mean at a 5-percentage-point window around the respective percentile. For example, the mean adjusted wage at the 10th percentile is calculated as the weighted mean of the adjusted hourly wage from the 8th percentile to the 12th percentile.[9]

Table 1. Compensation costs per hour for private industry workers, by benefit component and wage percentile, 2007 and 2014

Benefit component	Compensation cost					
	2007			2014		
	10th percentile	50th percentile	90th percentile	10th percentile	50th percentile	90th percentile
Adjusted wage	$8.87	$17.68	$42.48	$8.57	$16.98	$42.66
Total compensation less required benefits	9.62	21.91	54.31	9.30	21.50	56.73
Leave	.23	1.34	4.73	.21	1.40	5.07
Insurance	.01	.11	.36	.01	.10	.35
Health insurance	.42	2.14	3.77	.40	2.46	4.90
Retirement	.09	.64	2.97	.09	.56	3.74

Note: All values are in real dollars, adjusted to June 2014 with the use of the Consumer Price Index for All Urban Consumers. All percentile values refer to positions in the wage distribution.

Source: U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation.

Comparing benefit costs by component over time at different points in the distribution offers more insight into the aggregates presented in earlier figures. At the median, the adjusted hourly wage is lower in 2014 than in 2007; however, total compensation is statistically unchanged, because higher health insurance costs have offset decreased wages. This observation contrasts with a similar one for the upper end of the distribution. While workers at the 90th percentile experienced no statistically significant increase in wages, their compensation increased by $2.42 per hour, largely because of increases in employers' healthcare and retirement contribution costs. At the bottom end of the distribution, total compensation decreased in real terms between 2007 and 2014, by $0.32 per hour. Most of this decrease was driven by a drop in wage costs ($0.30 per hour), which is to be expected given that employers are less likely to offer benefits to workers at the lower end of the wage distribution.

Table 2 presents the log ratios of compensation and wages of private sector workers for the three points in the distribution. (A "log ratio" is the natural logarithm of the ratio of two numbers.) Because log ratios are less sensitive than ratios to the magnitude of the denominator, we use them in table 2 to measure inequality. Log ratios can also be meaningfully summed across the percentiles (the 90–50 and 50–10 log ratios sum to the 90–10 log ratio).

Table 2. Log ratios of wages and compensation for private industry workers, across wage percentiles and by benefit component, 2007 and 2014

Benefit component	Log ratio					
	2007			2014		
	90–10	90–50	50–10	90–10	90–50	50–10
Adjusted wage	1.57	0.88	0.69	1.60	0.92	0.68
Total compensation less required benefits	1.73	.91	.82	1.81	.97	.84
Leave	3.03	1.26	1.77	3.18	1.29	1.90
Insurance	3.58	1.19	2.40	3.56	1.26	2.29
Health insurance	2.20	.57	1.63	2.51	.69	1.82
Retirement	3.54	1.54	2.00	3.73	1.90	1.83

Note: Statistics are natural logarithms of ratios across wage percentiles from table 1.

Source: U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation.

The top half of the distribution accounts for the majority of the log wage differential. The 90–10 differential was 1.60 in 2014. The dispersion between the top and bottom wages can be decomposed into 0.92 for the 90–50 differential and 0.68 for the 50–10 differential (57.5 percent of the differential is driven by wage differences at the upper end of the distribution and 42.5 percent by differences at the lower end of the distribution).

What does it mean for the log wage differential to be 1.60 in 2014? The exponent of 1.60 equals 4.95, which implies that the 90th percentile wage is approximately 4.95 times the 10th percentile wage.[10] The wage ratio for 2007 is roughly equivalent to that for 2014.

Further, the 90–10 log compensation differential was 1.81 in 2014 and 1.73 in 2007—that is, total compensation at the 90th percentile was 6.11 times as much as that at the 10th percentile in 2014 and 5.64 times as much in 2007. The finding that the ratios for total compensation are larger than those for wages is consistent with the benefits levels presented in table 1. Workers at the lower end of the distribution have relatively low levels of compensation associated with benefits such as leave, health insurance, or retirement.

Inequality measures by occupational group

In this section, we present estimates of wage and compensation inequality for private sector workers, by broad occupational group. Table 3 shows total hourly compensation measured at the 90th and 50th percentiles, along with 90–10 log ratios for 2007 and 2014. Broad occupations are sorted by median 2014 compensation, in descending order.

Table 3. Total hourly compensation at the 90th and 50th percentiles and 90–10 log ratios for private industry workers, by broad occupational group, 2007 and 2014

Occupational group	Compensation				90–10 log ratio	
	2007		2014		2007	2014
	90th percentile	50th percentile	90th percentile	50th percentile		
Management	$98.87	$54.95	$108.27	$59.93	1.27	1.32
Architecture and engineering	81.58	50.95	84.61	54.85	1.08	1.08
Computer and mathematical	77.61	53.91	84.15	52.91	.96	1.08
Legal	124.17	46.05	99.33	45.06	1.65	1.31
Business and financial operations	68.34	42.15	77.33	43.79	.96	1.08
Life, physical, and social science	86.51	48.84	84.06	43.20	1.19	1.35
Healthcare practice and technology	62.66	36.77	68.34	36.72	1.04	1.32
Education, training, and library	67.79	28.13	64.64	30.87	1.73	1.64
Arts, design, entertainment, sports, and media	62.43	27.98	73.77	30.75	1.48	1.80
Installation, maintenance, and repair	50.46	28.39	56.07	27.09	1.21	1.40
Construction and extraction	52.44	24.28	55.60	24.67	1.34	1.42
Community and social service	36.69	25.98	36.79	24.25	.87	.93
Production	40.92	21.13	38.95	21.31	1.24	1.24
Office and administrative support	34.55	21.04	34.64	20.53	1.03	1.14
Transportation and material moving	33.92	19.13	37.43	18.56	1.30	1.39
Healthcare support	24.52	16.13	25.63	14.46	.93	.91
Sales and related	38.75	13.86	36.42	13.41	1.46	1.42
Building and grounds cleaning and maintenance	25.65	13.09	23.45	13.23	1.06	.96
Personal care and service	23.77	11.22	20.72	11.83	1.04	.92
Food preparation and serving related	15.96	9.14	15.09	8.88	1.24	1.47

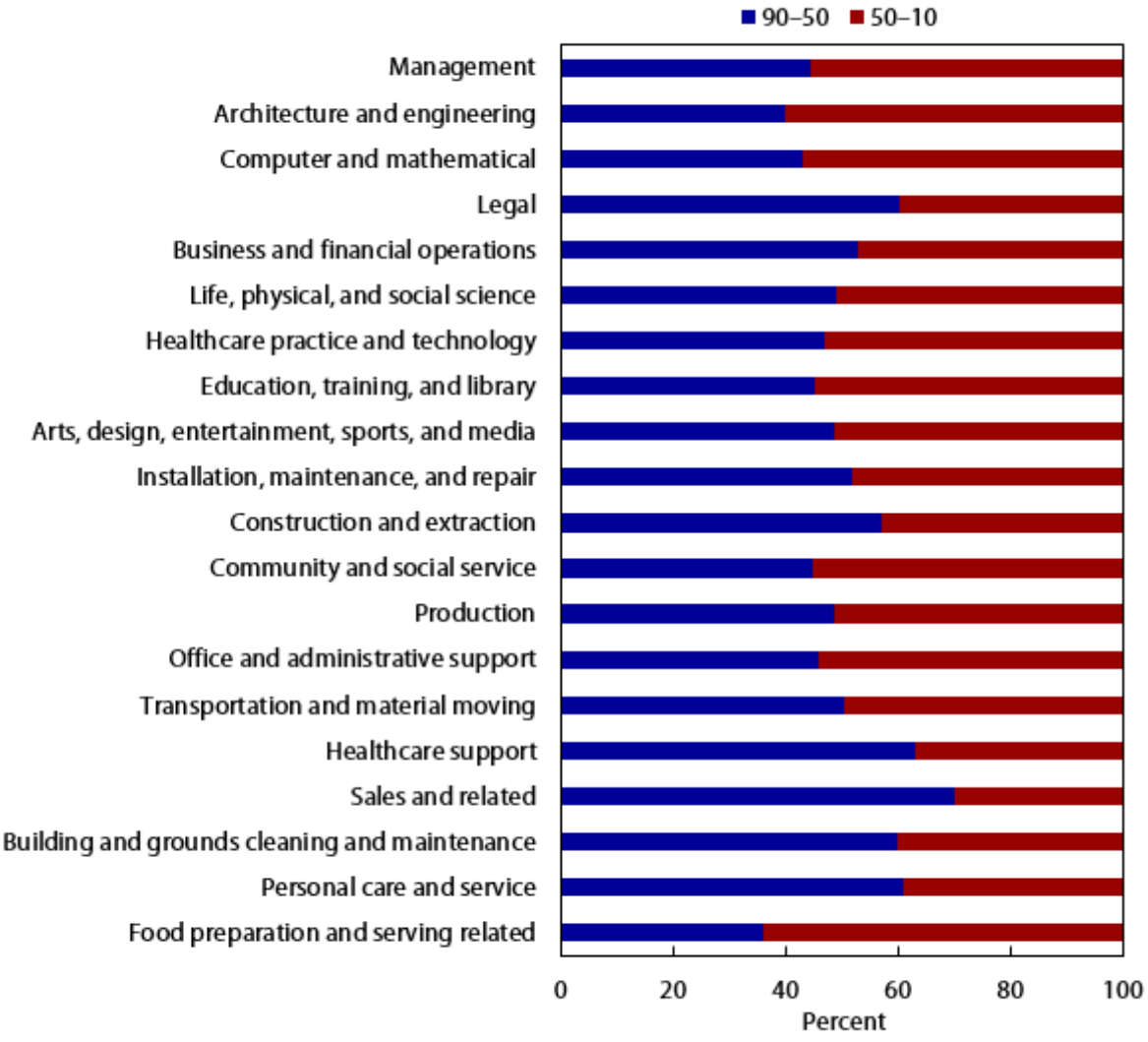
Source: U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation.

Recall from figure 2 that, at the median, private industry workers experienced decreases in total compensation between 2007 and 2014. Looking at the distributions by occupational group, we see that the only group with significant gains in median compensation is managers; most of the remaining groups had stagnant or declining compensation. At the 90th percentile, significant compensation gains occurred in the following high-paid occupations: management, computer and mathematical occupations, and business and financial operations occupations. Most other occupational groups did not experience significant changes in real compensation at the 90th percentile; however, sales and related occupations and personal care and service occupations—groups with already relatively low-paid jobs—experienced compensation declines.

The 90–10 log ratios of compensation presented in the last two columns of table 3 provide some insight into intraoccupational inequality. The differentials within occupational groups are large, and many have grown over the period. Recall that taking the exponent of the 90–10 log ratio provides dispersion measured as a multiple. For example, among management workers, those at the 90th percentile earned 3.56 times as much as those at the 10th percentile in 2007; in 2014, the differential was 3.74.[11] Among workers in the legal profession, those at the

90th percentile earned 5.21 times as much as those at the 10th percentile in 2007 and 3.71 times as much in 2014.

Figure 4. Decomposition of 90–10 log ratios, by broad occupational group, 2014



Source: U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation.

In Figure 4, 90–10 log ratios are broken down into the percentage driven by differences at the bottom half of the distribution (the 50–10 log ratio) and the percentage driven by differences at the top half of the distribution (the 90–50 log ratio). Again, broad occupational groups are sorted by median 2014 compensation.

In the top half of the distribution, the highest earners drive inequality measures in legal, construction and extraction, healthcare support, sales and related, maintenance, and personal care and service occupations. Workers at the lower half of the distribution drive inequality measures in management, architecture and engineering, computer and mathematical, education, community and social service, office and administrative support, and food preparation and serving related occupations.

Conclusions

We draw three broad conclusions from our evaluation of inequality measures for 2007 and 2014. First, measuring inequality on the basis of wages results in inequality measures that are lower than those based on total compensation. This result is driven, in large part, by more costly benefits among highly paid workers. Because benefits as a share of wages increase with wage percentiles, higher paid workers receive benefits with disproportionately higher costs. This relationship was more pronounced in 2014 than in 2007.

Second, presenting data on median compensation for broad occupational groups points to the jobs that spurred increases in inequality. We see an increasing compensation between 2007 and 2014 for high-earning occupational groups, such as management, and a flat or declining compensation for low-earning groups, such as personal care services. Finally, a considerable inequality exists within occupational groups. At the extremes in 2014, workers at the 90th percentile were compensated 2.48 times more than those at the 10th percentile in healthcare support occupations and 6.05 times more in arts, design, entertainment, sports, and media occupations.

SUGGESTED CITATION

Kristen Monaco and Brooks Pierce, "Compensation inequality: evidence from the National Compensation Survey," *Monthly Labor Review,* U.S. Bureau of Labor Statistics, July 2015, https://doi.org/10.21916/mlr.2015.24

NOTES

1 *Employer Costs of Employee Compensation: March 2015*, USDL–15–1132 (U.S. Department of Labor, June 10, 2015), https://www.bls.gov/news.release/ecec.nr0.htm.

2 For results for an earlier period (1987–2007), see Brooks Pierce, “Recent trends in compensation inequality,” in Katharine G. Abraham, James R. Spletzer, and Michael Harper, eds., *Labor in a new economy* (Chicago, IL: University of Chicago Press, 2010).

3 For additional information on the NCS sample design, see chapter 8, “National compensation measures,” *BLS handbook of methods* (U.S. Bureau of Labor Statistics, 2012), https://www.bls.gov/opub/hom/pdf/homch8.pdf.

4 The period was chosen to capture the inequality measure at the peak of the business cycle before the 2007–2009 recession and to observe its change through the most recent quarter for which data were available.

5 Because the ECEC uses only the average hourly straight-time rate, our estimates for wages and salaries and compensation differ from published estimates. In addition, the standard errors computed for this analysis do not match published ECEC estimates of standard errors, because the full survey design was not incorporated in our calculation.

6 In this article, we use the term “wage” to denote both wages and salaries.

7 See, for example, David H. Autor, “Skills, education, and the rise of earnings inequality among the ‘other 99 percent’,” *Science* 344, May 2014, http://seii.mit.edu/wp-content/uploads/2014/05/Science-2014-Autor-843-51.pdf; and Claudia Goldin and Lawrence F. Katz, *The race between education and technology* (Cambridge, MA: Belknap Press, 2008).

8 Graphs were generated using kernel-weighted local polynomial smoothing (fifth degree).

9 The estimated costs for 2007 are presented in June 2014 dollars. The classification of benefits and the method of computing percentiles differ from those used for published ECEC estimates.

10 This result agrees with the first row of table 1.

11 Exp(1.32) = 3.74 and exp(1.27) = 3.56.

RELATED CONTENT

Related Articles

The growth of income inequality in the United States, *Monthly Labor Review*, April 2015.

Measuring the distribution of wages in the United States from 1996 through 2010 using the Occupational Employment Survey, *Monthly Labor Review*, May 2014.

Differences between union and nonunion compensation, 2001–2011, *Monthly Labor Review*, April 2013.

Economic inequality through the prisms of income and consumption, *Monthly Labor Review*, April 2005.

Related Subjects

Benefits | Income | Earnings and wages | Compensation | Occupations