



Nathan Sheets, PhD.

Chief Economist,
Head of Global Macroeconomic
Research



George Jiranek

Associate,
Global Macroeconomic Research

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The Great “Hollowing Out” of the U.S. Job Market

The U.S. labor market has shown sustained strength in the years since the global financial crisis. In assessing this performance, however, it is also important to consider the quality of the jobs that have been created. Have the new jobs been low-paying relative to those that existed previously? What occupations and industries have added the most jobs?

In this paper, we perform an empirical exercise to examine these questions. We find that the jobs created through the current expansion have a distinct “barbell” feature. The economy has generated a big chunk of high-paying jobs in sophisticated fields like management, computer and mathematical science, and business and finance. Similarly, many jobs have been created in low-skilled, low-paying segments, such as food preparation and personal care and services. Consistent with this, we also find a remarkable further hollowing out of jobs in the middle of the income distribution.

This evidence echoes a broad academic literature that has documented a polarization in the labor market during the past four decades.¹ The academic work has linked these developments principally to the effects of evolving technology, but secondarily to trade, globalization, and offshoring. Our paper shows that these broad employment trends have continued with some intensity in the years since the financial crisis.

This discussion highlights some of the deep drivers of rising income inequality in the United States. These forces have brought very different results for workers in differing industries and with various levels of education and types of skills. Given that the forces in play seem likely to be persistent, policymakers, market participants, and individual workers are well-advised to embrace these trends and tailor strategies to harness the opportunities that they will generate. We provide some broad thoughts on how this might be done in the paper’s concluding section.

Aggregate Job Creation Since the Financial Crisis

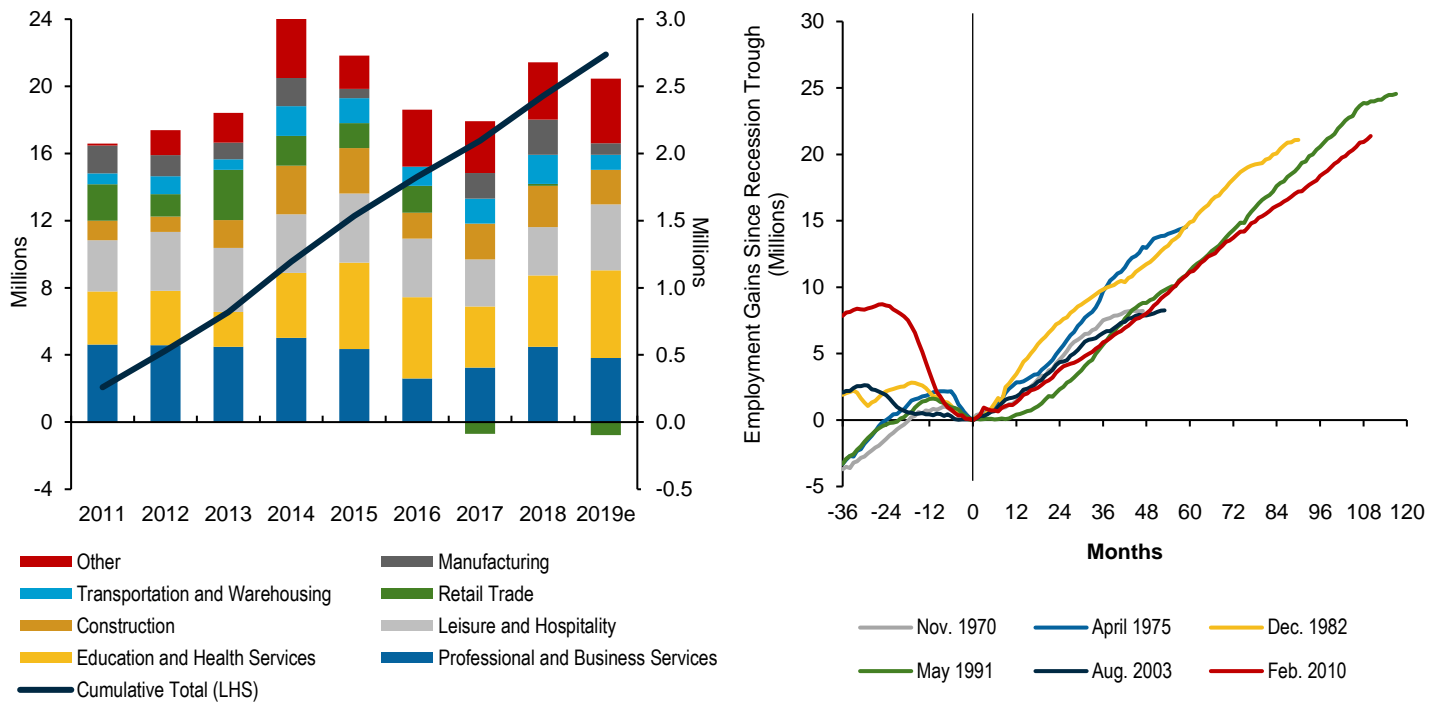
As shown in Figure 1, the U.S. economy has created over 20 million new jobs since January 2011, an average of 200,000 jobs per month. The peak pace of job creation was reached in 2014, but it continued to run at a surprisingly strong clip through 2018, even as the unemployment rate remained low. Roughly 60% of these new jobs have come in services sectors, including professional and business services, education and health services, and leisure and hospitality. In addition, the U.S. economy has added 1 million manufacturing jobs, not exactly a manufacturing renaissance, but at least a moderate recovery from the financial crisis. Construction, retail, and transportation have also notched more than a million new jobs each.

¹ As a sample of these papers see, “The Growth of Low-Skill Service Jobs and the Polarization of the U.S. Labor Market,” Autor and Dom, 2013; “Changes in Unemployment and Wage Inequality,” Acemoglu, 1999; “Long-Run Changes in the U.S. Wage Structure: Narrowing, Widening, Polarizing,” Goldin and Katz; 2007; “Job Polarization and Jobless Recoveries,” Jaimovich and Siu, revised 2018; and “Spillovers from High-Skill Consumption to Low-Skill Labor Markets,” Mazzolari and Ragusa, 2007. Brynjolfsson and Mitchell (“What Can Machine Learning Do? Workforce Implications,” *Science*, 22 December 2017) argue that the next round of hollowing out will occur in non-routine jobs for which analysis of data regularities reveals a strategy. Michaels, Natrej, and Rennan provide evidence that the hollowing out of middle-wage jobs has occurred in other advanced economies as well (“Has ICT Polarized Skill Demand? Evidence from Eleven Countries over 25 years,” NBER Working Paper 16138, 2010).

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Figures 1 and 2: Post-Crisis Employment (Annual Jobs Added) and Employment During Expansions



Source: PGIM Fixed Income, Haver Analytics, and U.S. Bureau of Labor Statistics as of May 2019. Note on Figure 2: t=0 is the trough of employment.

Figure 2 puts the recent performance of the labor market into longer-term perspective. Job creation during this expansion has been remarkably stable and sustained. Consistent with this observation, in July, the current expansion will become the longest-lived of the post-war period. Even so, the trajectory of job creation has been modest compared to several previous post-war expansions, particularly those beginning in 1975 and 1982, although those expansions also showed much less longevity. Of course, the figure shows absolute numbers of jobs created. Compared with the size of the labor market, the recent performance looks somewhat more subdued.

A Closer Look at the Newly Created Jobs

We now turn to a more granular examination of the labor market’s recent performance. The data that we use come from the Occupational Employment Statistics (OES) published by the Bureau of Labor Statistics. This extensive dataset covers non-farm employment and provides detailed data across 22 occupations and 88 industries. In total, we track 1,458 different occupation-industry categories.² The largest category is cooks and servers in food and beverage services (10.6 million employees), followed by teachers in education (7.7 million), and registered nurses, technicians, and physicians in hospitals (3.4 million). Some of the smaller occupations include personal care and support in chemical manufacturing (50 workers) and life and social scientists in postal services (90 workers). When aggregated, these data broadly track the macro employment and wage data published separately.

Figure 3 examines the jobs created since the recovery took hold. For simplicity, we start with a relatively aggregated cut of the data. We look at the average wage for each occupation across all industries. Since 2010, a full quarter of these jobs were in food preparation and personal care and services—two categories with the lowest average wages. In contrast, only 11.4% of the jobs in 2010 were in these two categories. **With this evidence in hand, it’s fair to say that the new jobs that have been created have been skewed toward the lowest-paying job categories.**

² While in principle, there could be up to 1,936 occupation industry categories (i.e., 22 occupations for 88 industries), some categories contain no observations. For example, there are no observations in Healthcare Support in Beverage and Tobacco Product Manufacturing, Community and Social Services in Oil and Gas Extraction, Architecture/Engineering in Gas Stations, and Construction and Extraction in Credit Intermediation and Related Activities.

Figure 3: New Jobs Added Since 2010

| | Employment Share (Percent) | | | Share of New Jobs Added (Percent) 2010-2018 | Salary (\$/Year) | | Contribution to Difference Between Green and Yellow |
|--------------------------------------|----------------------------|-------|-------|---|------------------|-------------|---|
| | 2010 | 2018 | Delta | | Average 2018 | Median 2018 | |
| Total | 100.0 | 100.0 | | 100.0 | | | \$5,325 |
| Management | 4.7 | 5.3 | 0.5 | 9.0 | \$121,560 | \$104,240 | \$2,992 |
| Office & Administrative Support | 16.9 | 15.1 | -1.8 | 1.8 | \$38,990 | \$35,760 | \$1,955 |
| Computer & Mathematical Science | 2.6 | 3.0 | 0.4 | 6.2 | \$91,530 | \$86,340 | \$1,446 |
| Business & Financial Operations | 4.8 | 5.3 | 0.5 | 9.2 | \$76,910 | \$68,350 | \$1,111 |
| Healthcare Practitioner & Technical | 5.8 | 6.0 | 0.2 | 7.4 | \$82,000 | \$66,440 | \$478 |
| Healthcare Support | 3.1 | 2.8 | -0.3 | 0.9 | \$32,380 | \$29,740 | \$439 |
| Sales & Related | 10.6 | 10.0 | -0.5 | 6.3 | \$41,790 | \$28,180 | \$438 |
| Building & Grounds Maintenance | 3.3 | 3.1 | -0.2 | 1.4 | \$30,020 | \$26,840 | \$414 |
| Production | 6.5 | 6.3 | -0.2 | 5.0 | \$39,190 | \$35,070 | \$191 |
| Protective Service | 2.5 | 2.4 | -0.1 | 1.4 | \$48,580 | \$40,640 | \$37 |
| Community & Social Services | 1.5 | 1.5 | 0.0 | 1.5 | \$49,280 | \$44,960 | -\$1 |
| Arts, Entertainment, Sports, & Media | 1.4 | 1.3 | 0.0 | 1.3 | \$59,780 | \$49,290 | -\$2 |
| Installation, Maintenance, & Repair | 3.9 | 3.9 | 0.0 | 4.0 | \$48,960 | \$45,540 | -\$3 |
| Construction & Extraction | 4.0 | 4.1 | 0.1 | 5.0 | \$51,220 | \$46,010 | -\$8 |
| Legal | 0.8 | 0.8 | 0.0 | 0.8 | \$108,690 | \$80,810 | -\$8 |
| Farming, Fishing, & Forestry | 0.3 | 0.3 | 0.0 | 0.4 | \$30,140 | \$25,380 | -\$19 |
| Life, Physical, & Social Science | 0.8 | 0.8 | 0.0 | 0.6 | \$76,160 | \$66,070 | -\$55 |
| Architecture & Engineering | 1.8 | 1.8 | 0.0 | 1.4 | \$87,370 | \$80,170 | -\$139 |
| Education, Training, & Library | 6.7 | 6.1 | -0.6 | 1.8 | \$56,620 | \$49,700 | -\$225 |
| Transportation & Material Moving | 6.7 | 7.1 | 0.4 | 9.6 | \$38,290 | \$32,730 | -\$395 |
| Food Preparation & Serving Related | 8.7 | 9.2 | 0.6 | 13.3 | \$25,580 | \$23,070 | -\$1,222 |
| Personal Care & Service | 2.7 | 3.8 | 1.1 | 11.5 | \$28,090 | \$24,420 | -\$2,099 |

| Memo | 2010 | 2018 | 2010-2018 |
|---|----------|----------|-----------|
| Average Salary (\$/Year, Fixed 2018 Salaries) | \$51,296 | \$51,945 | \$56,621 |
| Average Salary (\$/Year, Fixed 2010 Salaries) | \$43,485 | \$44,083 | \$48,392 |

Source: PGM Fixed Income, Haver Analytics, and U.S. Bureau of Labor Statistics

However, the data yield another important observation—high-paying job categories also account for a disproportionate share of the new jobs created during the expansion. Specifically, 9.0% of the new jobs were in management, 6.2% in computer and mathematical science, 9.2% in business and financial operations, and 7.4% in higher-paying health care jobs (e.g., doctors, dentists, and nurses). In sum, 31.8% of the new jobs have been in these categories, compared with just 17.9% in 2010. **Thus, it’s also fair to say that the new jobs that have been created have been skewed to high-paying jobs categories.**

One other high-level feature of the data is notable. Office and administrative support positions, a lower-paying category, were less than 2% of the new jobs versus 16.9% of the existing jobs in 2010. The data document a notable substitution away from this job category.

In sum, the striking result is that during the current expansion, the economy has created a disproportionate share of high-paying jobs, a disproportionate share of low-paying jobs, and posted a marked decline in a large, lower-paying category. We see this evolution as bearing the imprint of technological change. Many of the rising high-paying categories have likely been supported by improving technologies, and the shrinking of job creation in the office and administrative support category reflects that technology has allowed many of these jobs to be automated or, at least, performed in less labor-intensive ways. In contrast, the rising share of relatively low-paying jobs in food preparation and in personal services is driven by workers in higher-paying jobs—which have benefited from technological forces—recycling their earnings back into the economy.

What Does this Mean for Aggregate Wages?

So, on balance, how do the wages paid to the jobs added since 2010 compare to the jobs that were already in place? Are the new jobs, on average, higher paid, lower paid, or paid similarly to those that existed previously?

As highlighted by the number in green at the bottom of Figure 3, the average wage in 2018 across all of these new jobs was \$56,621. This number is actually higher than the overall average wage in 2018 of \$51,945. The implication is that the new jobs were somewhat better paid on average or, **in other words, that in aggregate the upward push on wages from the high-paying jobs that were created was greater than the downward-pull from the low-paying jobs.**

As yet another measure, if the distribution of jobs had remained fixed from 2010, i.e., the new jobs had been distributed across categories precisely as those that existed in 2010, the average wage in the United States would have been \$51,296 (the yellow number in Figure 3), a little lower than the average actually observed (\$51,945). All of these measures suggest that **the new jobs created between 2010 and 2018 were, on average, somewhat better paid than those that existed in 2010.**³

The last column of the table quantifies the contribution of the various job categories to the observed change in aggregate wages. Specifically, we report each occupation’s contribution (in dollars) to the difference between the green and yellow numbers (at the bottom of the table). The green number is the average salary of jobs created since 2010. The yellow number is the average that would have prevailed *if the mix of jobs had remained unchanged* from 2010. The difference between these two numbers gives a clean reading of the effect on aggregate wages from the shifting composition of jobs.

We find that the average salary for the jobs created since 2010 is driven up by high-paying categories that added jobs—management, computer and mathematical science, business and financial operations, and healthcare practitioners. But it is also lifted by the declining share of office and administrative support, a low-paying category. In contrast, the average wage for these new jobs is pulled down significantly by the higher share in food preparation and personal care and services.

The data are comprehensive and allow us to also calculate the median wage for each job category (shown in the second to last column). We find large gaps between the mean and median in occupations, such as legal, sales, healthcare practitioners (e.g., doctors), and arts and entertainment. In these fields, “star” performers tend to be very highly compensated, and this pushes the mean upward relative to the median. In contrast, the means and medians are remarkably similar in two high-paid STEM occupations: computer and mathematical sciences and architecture and engineering. At the lower end of the pay scale, the wage structure also seems to be fairly flat for office and administrative support, healthcare support, and installation, maintenance, and repair. Across the entire data set, the median wage in 2018 was \$38,630 versus a calculated mean of \$51,945.⁴ This highlights the upward skew in the wage distribution, reflecting the imprint of highly paid workers.

A More Disaggregated Examination

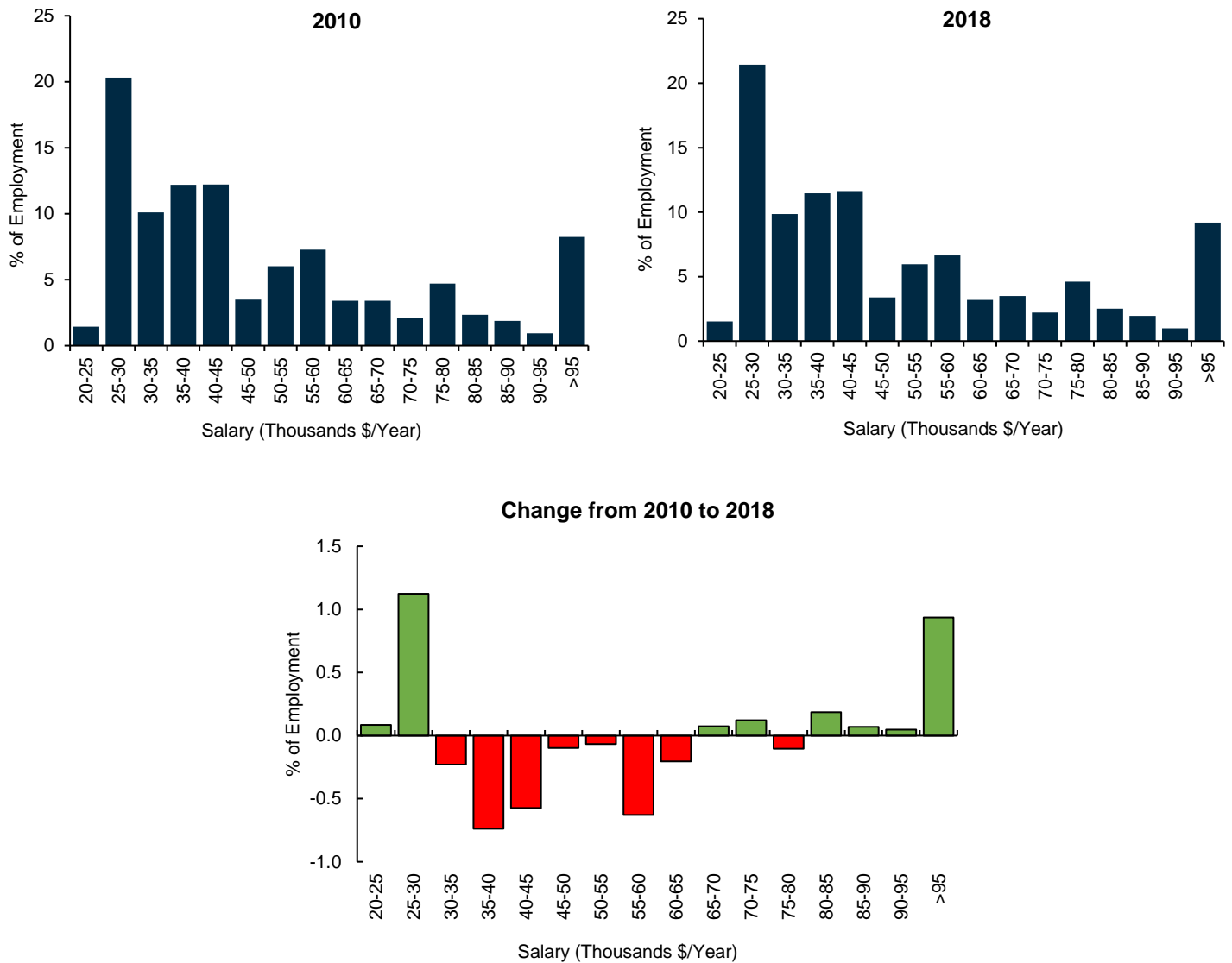
The data are sufficiently granular to provide insight into the average wage for each of the 22 job classifications in 88 different industries. We use this feature of the data to get a more detailed assessment of how jobs and wages have evolved. A low-paying category in a high-paying industry might, in principle, pay higher wages than a high-paying category in a low-paying industry. For example, office and administrative support in a law-firm or a management consultant might be better compensated than a manager in a custodial firm or a fast-food company. In other words, compensation is broadly determined by the interaction between job classification and industry.

³ To be clear, in this discussion we are looking only at the effects of the shifting distribution of jobs. In each of these exercises, we hold sectoral wages constant at their 2018 values. The table also shows qualitatively similar results if we instead use fixed 2010 salaries for each of the job classifications.

⁴ This gap widened between 2010 and 2018. In 2010, the mean was 28.5% higher than the median, by 2018 it was 34.4% higher.

The results of this exercise are displayed in Figure 4. The left panel shows the distribution of salaries using the 2010 employment shares as weights. The right panel shows the same data using the actual 2018 employment distribution. Both panels reflect salaries paid in 2018, which allow us to focus entirely on the implications of the evolving distribution of jobs across industries. Finally, the bottom panel shows the difference between the two distributions.

Figure 4: U.S. Salary Distributions



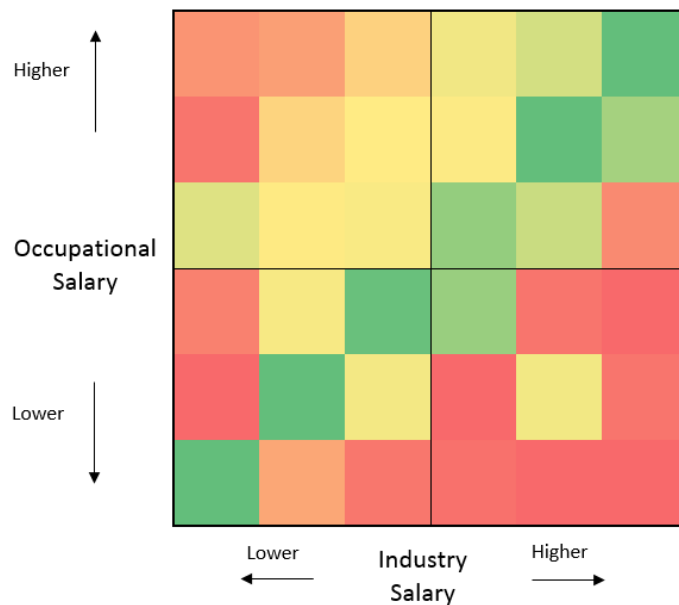
Note: Employment shares from 2010 with fixed 2018 salaries. Note: Employment shares from 2018 with 2018 salaries. Source: PGIM Fixed Income, Haver Analytics, and U.S. Bureau of

Consistent with our discussion above, between 2010 and 2018, the share of the lowest-paying employment-industry categories, those earning less than \$30,000, increased markedly. This mainly reflected a large gain in food servers, who made just over \$25,000 on average in 2018. The second largest increase, however, occurred at the other end of the distribution, where salaries exceeded \$95,000 a year. Categories in the middle of the distribution, those paying \$30-65,000 a year, generally saw significant contractions. **Taken together, we see this as further evidence of a hollowing out of middle-class jobs. In the years since the expansion began, employment has become more polarized in high-end and low-end jobs.**

Figure 5 shows a heat map depicting the disaggregated changes in employment since 2010. Along the horizontal axis, industries are ordered from lowest paying to highest paying. On the vertical axis, occupations are similarly sorted from lowest paid to highest paid. These orderings are based on 2010 salaries,⁵ and each row and column captures a roughly comparable quantum of job creation. The colors vary gradually from bright red (for cells with employment gains in the bottom 10%) to bright green (for cells with gains in the highest 10%). Yellow represents the 50th percentile.

This heat map underscores several of the paper’s key observations. First, the southeast quadrant—higher paid industries’ hiring of lower-paid workers—has been very weak. As we have documented, these industries have shed support staff and otherwise employ few lower-paid workers. Second, job creation in the northwest quadrant—lower-paid industries and higher-paid employees—has been lackluster at best. These are solidly middle-class jobs, and they have become much less abundant. This quadrant seems to best capture the “hollowing out” feature of the data that we have observed elsewhere. Third, the matrix’s diagonal that runs from the southwest to the northeast is generally bright green. As before, we see the lowest-paid industries loading up on the lowest-paid workers, and the highest-paid industries loading up on the highest-paid workers. But, remarkably, this matching of workers and industries occurs all along the salary scale. **Firms in a given part of the salary distribution tend to hire workers primarily from a similar spot in the salary distribution.** Since we have ordered the data based on initial 2010 salaries, this result suggests some stability in the industry wage-distribution—e.g., average-paying firms tend to remain average-paying firms. **We thus conclude that the polarization and hollowing out of the job market that has occurred since 2010 does not reflect shifting preferences for workers across firms but, rather, that much of the hiring that has occurred has been in relatively low-paying and high-paying firms.**

Figure 5: Post-Crisis Employment Gains Heat Map



Source: PGIM Fixed Income as of May 2019

⁵For statistical reasons, we see this approach as cleaner than sorting using 2018 data (i.e., it compares initial salary levels to subsequent changes in employment and thus helps avoid artificial correlations that might arise in the data). However, as a practical matter, the heat map is essentially identical if we use 2018 salaries instead.

Concluding Thoughts

The results we have presented shed light on some of the roots of the deepening inequality seen in the United States. There is clearly an increasing gap between those workers who are benefitting from the secular forces that are influencing the path of the U.S. economy and those who have been harmed. For those benefitting, mainly workers with sophisticated cognitive skills, improving technology has been broadly complementary to their efforts, expanding the impact or technical precision of their work. And globalization has added new markets and expanded demand for their products. For those who have been harmed, technology has provided lower-cost substitutes for the output that they were producing and, as a result of global integration, they have faced increased wage competition from abroad. These folks are still employed—after all the U.S. unemployment rate is running at 3.6%, a 50-year low—but many of these workers have moved to relatively low-paying jobs.

An open question from this work is whether the shifting employment composition that we have documented is also having an effect on aggregate productivity. Presumably, the high-end jobs that have been created are also high-productivity jobs. Further, those sectors that have seen employment become obsolescent because of improving technologies have most likely seen productivity rise with automation. However, as workers have left these sectors and flowed to newly created positions, many of which are in lower-tech industries, this has no doubt tended to pull productivity down. We will examine the effects of this reallocation of employment—another possible explanation for the slowdown in U.S. productivity growth—in future work.

In terms of wider implications, the upshot of our analysis is that the drivers of expanding inequality in the United States are deep and probably not easily blunted. Rather than fighting these trends, policymakers would be well advised to help facilitate the economy’s adaptation. Most fundamentally, this means strengthening the education system and enhancing efforts for worker retraining. Further, the apparent durability of these forces suggests that the divergent consumption patterns for high-income and lower-income households that we have observed in recent years are likely to continue through the foreseeable future. The former will have plenty of resources for luxury goods, while the expenditure of the latter will be mainly concentrated in consumer staples and other necessities. For aggregate consumption, the key question will continue to be the evolution of the overall unemployment rate. Finally, for financial markets, the differential impact across industries creates enormous relative value opportunities as the effects of technology and globalization diffuse their way through the economy. In addition, high-end workers who are major beneficiaries of these developments will continue to be well-positioned to provide streams of investment capital to drive expansion of global financial markets.

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Source(s) of data (unless otherwise noted): PGIM Fixed Income as of June 2019.

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