

# Chicago Fed Letter

## What does the changing sectoral composition of the economy mean for workers?

by Isaac Sorkin, *business economist*

Over the past quarter of a century, the share of jobs in the U.S. economy in manufacturing has declined, while the share of jobs in services has risen. A common view is that because manufacturing jobs are relatively high-paying jobs, this shift has been negative for workers. However, jobs also differ in other ways, so looking only at pay gives an incomplete picture.

In this *Chicago Fed Letter*, I ask whether the changing sectoral composition of the U.S. economy since 1990 has had, on net, positive or negative effects on workers. My analysis considers the pay of workers in the sector, as well as the possibility that sectors might offer different, nonpay rewards.

To measure sector-level pay, I look at systematic patterns of changes in pay when workers switch sectors. Hence, the measure of sector-level pay holds worker skills constant. To measure sector-level nonpay rewards, I look at the information contained in worker choices and especially job-to-job moves. The idea is that workers take into account both pay and nonpay rewards when deciding to switch firms, so I can infer the importance of nonpay rewards.

My first key finding is that the shifts in sectoral composition have, on net, been negative. Between January 1990 and March 2016, pay fell by 2.9 percentage points solely because jobs shifted to sectors with lower pay. However, these lower-paying sectors have more-desirable nonpay characteristics, offsetting roughly half of the pay losses due to sectoral shifts. Therefore, accounting for the changes in both pay and nonpay compensation, workers have lost about 1.4 percentage points of the value of jobs over the past quarter of a century due to the shifting sectoral composition of jobs.

My second key finding is that the trend toward lower-paying sectors has continued in this recovery: Since January 2010, the composition of jobs has shifted toward sectors that pay 0.5% less. Moreover, in contrast to earlier years, faster-growing sectors do not have more-desirable nonpay characteristics; so accounting for both changes in both pay and nonpay characteristics, sectoral shifts have reduced the value of workers' employment by 0.5% since January 2010.

### Measuring sectoral employment

To measure the sectoral composition of employment, I use data from the U.S. Bureau of Labor Statistics' *Current Employment Statistics* survey. Specifically, the survey classifies each job according to its sector. I use the survey for each month from January 1990 to March 2016 to construct the share of employment accounted for by each of 19 sectors.<sup>1</sup>

To highlight the key trends, figure 1 plots the four (out of 19) sectors with the largest percentage point change in employment since 1990, as well as the sum of the nine sectors that saw a decrease in share over the period and the six sectors that saw an increase in share over the period. The employment share of manufacturing declines by about 9 percentage points over this period, while the employment share of health care rises by about 5 percentage points. The two remaining sectors with the largest movements are administrative support and waste management (which also includes temporary help workers) and professional and business services.

I consider the impact of these large changes in sectoral composition on the value of jobs, taking into account pay and nonpay characteristics.

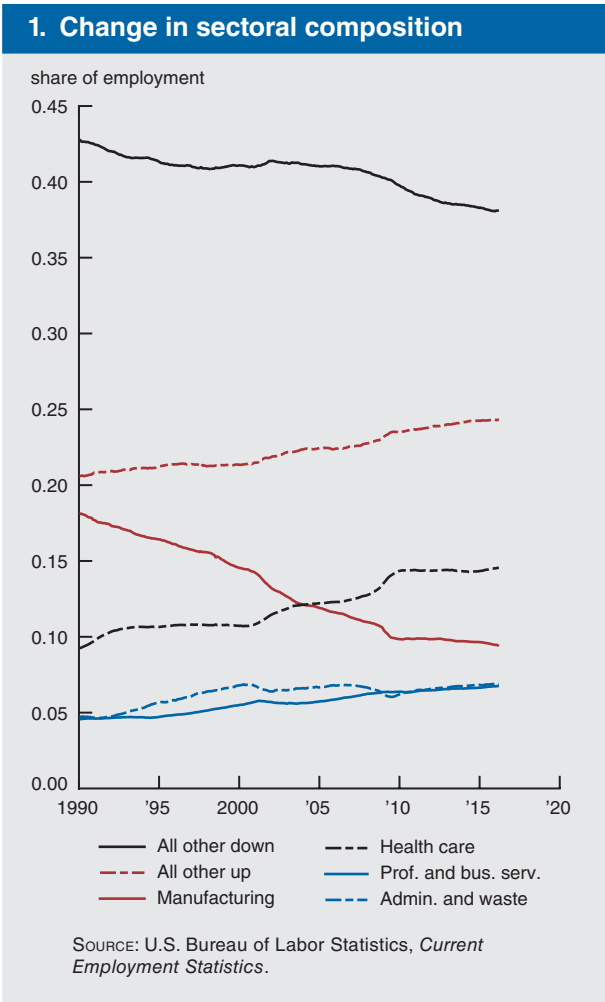
**Measuring sector-level pay and nonpay characteristics**

What does it mean to be a desirable sector? One might consider pay as evidence that a sector is desirable. But looking solely at average pay in a sector might be misleading for two reasons. First, sectors might be high-paying because they employ highly skilled workers. Second, sectors might be high-paying to compensate for undesirable nonpay characteristics, such as dangerous or unpleasant working conditions or inadequate benefits.

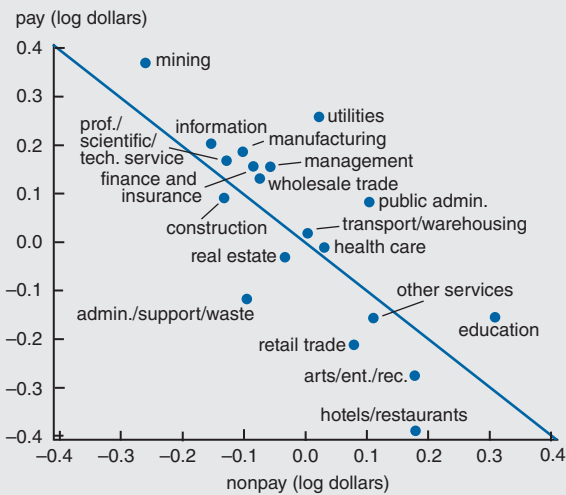
To address these concerns, I use estimates of sector-level pay and nonpay characteristics that I developed in other work.<sup>2</sup> I develop these measures at the firm level and then aggregate across all firms to have a sector-level measure. The firm-level pay is based on workers who are employed at two different firms. If the same worker is paid more at one firm than at the other firm, then we have held the worker’s skills constant. Aggregating across all cases where a worker is employed at two firms gives a measure of whether a firm is high-paying or low-paying.

To understand the approach to estimating the value of being at a firm, imagine all of the factors a worker considers desirable about firms—pay of course, but also many nonwage factors such as benefits, working conditions, the structure of schedules, the “feel” of the firm, and so forth. Rather than trying to measure and assign a value to each of these characteristics, I focus on the actual choices made by workers. The benefit of exploiting these choices is that they reflect workers’ assessments of the desirability of the entire bundle of characteristics at a firm.

Specifically, to estimate the desirability of a firm I look at the information contained in job-to-job moves. When a worker moves from firm A to firm B, she reveals that she prefers firm B to firm A. Moreover, if workers are very likely to stay at a firm, then this reveals that they prefer the firm to other options in the labor market. Combining these pieces of information gives an estimate of the value of working at a particular firm. By combining the value of the firm with the pay at the firm, I can back out how much of the value of the firm reflects nonpay characteristics.

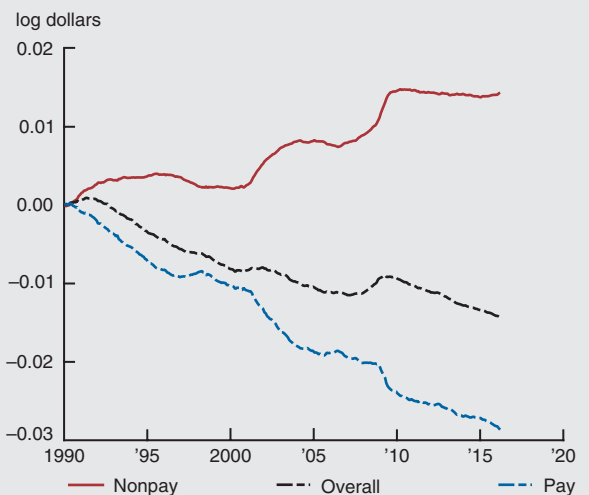


## 2. Sector-level pay and nonpay characteristics



SOURCE: Author's calculations based on estimates in Isaac Sorkin, 2015, "Ranking firms using revealed preference," University of Michigan, mimeo, November, <https://goo.gl/fu6YUS>.

## 3. Trends in pay, nonpay, and overall value



SOURCES: Author's calculations based on data from U.S. Bureau of Labor Statistics, *Current Employment Statistics*, and estimates in Isaac Sorkin, 2015, "Ranking firms using revealed preference," University of Michigan, mimeo, November, <https://goo.gl/fu6YUS>.

Figure 2 shows the resulting estimates of the pay and nonpay characteristics of sectors using data from 2001 through 2007. To construct the figure, I take the employment-weighted average of the value of each firm within a sector. The x-axis shows the nonpay characteristics in the sector (in log dollars of annualized pay). The sectors farther to the right have more-desirable nonpay characteristics. For example, education has the most and mining has the least desirable nonpay characteristics. The y-axis shows the sector-level pay, with higher-paying sectors toward the top. Mining is high-paying, and education is lower-paying. The diagonal line shows when the pay and nonpay characteristics cancel out. Sectors above the line are relatively desirable, and sectors below the line are relatively undesirable. For example, even though I estimate that manufacturing has unpleasant nonpay characteristics, I still find that it is a relatively desirable sector.

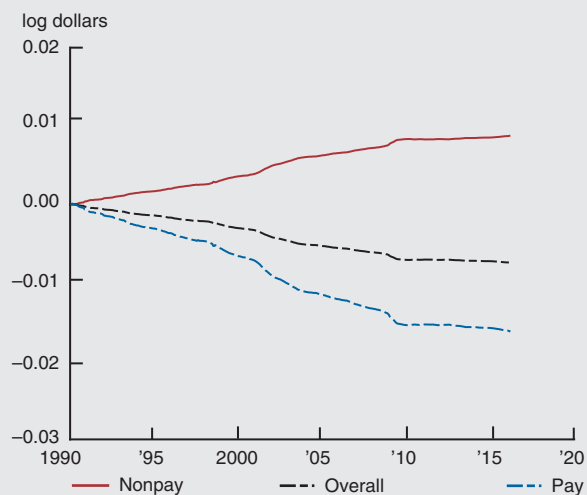
## Desirability of sectoral composition changes

I now use the estimates reported in the previous section to evaluate, from the worker perspective, the desirability of sectoral changes. To construct a sectoral index of pay and nonpay values, I assume that jobs that were created or destroyed within a sector had the same level of pay and nonpay as the average job that existed in a sector from 2001 to 2007. This is a simplifying assumption that is likely not to hold exactly. For example, sectors that shrink may shed their worst jobs, and sectors that grow may gain more-desirable jobs. Or sectors might change over time; for example, a sector might shift toward higher-skilled occupations. Nevertheless, it is not obvious in which direction these effects bias estimates, so this approach provides a reasonable sense of big-picture trends.

Keeping these caveats in mind, I show in figure 3 that changes in sectoral composition depressed real pay growth by 2.9 percentage points from 1990 to 2016. This change in pay, however, overstates the change in the overall value of jobs because the economy is moving toward sectors that are more desirable along nonpay dimensions. Changes in nonpay compensation offset about half of the decline in pay, so that sectoral composition changes led to the equivalent of a 1.4 percentage point decline in pay since 1990.

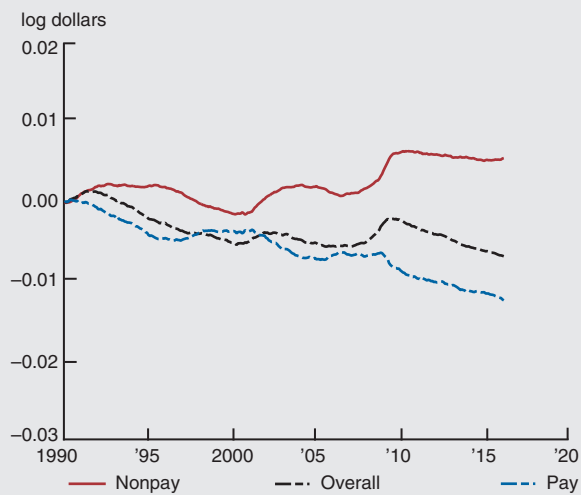
Is the role of changing sectoral composition big or small? From 1990 to 2016, real weekly earnings grew by 11.2%.<sup>3</sup> All else being equal, then, these sectoral shifts were the equivalent of about three or four years of real wage growth.

#### 4. Contribution of manufacturing sector to overall trends



SOURCES: Author's calculations based on data from U.S. Bureau of Labor Statistics, *Current Employment Statistics*, and estimates in Isaac Sorkin, 2015, "Ranking firms using revealed preference," University of Michigan, mimeo, November, <https://goo.gl/fu6YUS>.

#### 5. Contribution of nonmanufacturing sector to overall trends



SOURCES: Author's calculations based on data from U.S. Bureau of Labor Statistics, *Current Employment Statistics*, and estimates in Isaac Sorkin, 2015, "Ranking firms using revealed preference," University of Michigan, mimeo, November, <https://goo.gl/fu6YUS>.

As can be seen in figures 1 and 3, the decline in manufacturing plays a large role in the aggregate trends, even though in 1990 manufacturing accounted for only 18% of total U.S. employment. Manufacturing is a relatively high-paying and high-value sector, but some of this high pay compensates for relatively undesirable nonpay characteristics. Figure 4 shows what would have happened to the pay, nonpay, and overall value of sectors if the only change had been the decline of manufacturing. The figure shows that the decline of manufacturing has exerted a 1.6 percentage point pull on pay since 1990, but about half of this change is offset by manufacturing's relatively undesirable nonpay attributes. Figure 5 shows the equivalent picture for the remaining sectors pooled together. The overall trends outside of manufacturing are similar to those within manufacturing, but the path is much less smooth.

A common discussion in assessing employment growth in a recovery is whether the economy is creating good or bad jobs. Figure 3 shows that this recovery is creating jobs that offer lower value to workers, taking into account both pay and nonpay characteristics. This is fully captured in lower pay, with no discernible trend in the value of nonpay characteristics. In the early 2000s recovery the trend in overall value was flat, while in the early 1990s recovery there was a downward trend.

## Conclusion

I provide some evidence on the desirability of changes in sectoral composition over the past quarter century. This evidence is imperfect due to its coarse nature. Nevertheless, my main result is that over the past 25 years the economy has been shifting toward sectors that are, from the worker's perspective, relatively undesirable. Earnings losses overstate these trends by a factor of two, however, as jobs are shifting toward sectors with relatively higher nonpay compensation. More recently, in this recovery the secular move toward lower-paying sectors has continued, but it has not been offset by a move toward sectors offering higher nonpay compensation.

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<sup>1</sup> The data set used to construct the sector-level pay and nonpay characteristics includes state and local governments, but not the federal government. Hence, I aggregate state and local government sectors, except education, into one category.

<sup>2</sup> See Isaac Sorkin, 2015, “Ranking firms using revealed preference,” University of Michigan, mimeo, November, <https://goo.gl/fu6YUS>. The firm-level measure of pay is based on John M. Abowd, Francis Kramarz, and David N. Margolis, 1999, “High wage workers and high wage firms,” *Econometrica*, Vol. 67, No. 2, March, pp. 251–333.

<sup>3</sup> This statistic uses average weekly earnings and hours for production and nonsupervisory workers and adjusts to real earnings using the U.S. Bureau of Labor Statistics’ Consumer Price Index for All Urban Consumers.

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