

Job Quality During the Expansion¹

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1. Introduction

After the Great Recession began in December 2007, U.S. nonfarm payroll employment fell by about 8.7 million jobs; 8.8 million jobs were lost in the private sector. Owing in part to the severity of this decline, it has taken considerably longer than in earlier business cycles to return to pre-recession employment levels (see **Figure 1**). However, by April 2014, the U.S. economy finally achieved this milestone, and job growth in 2014 was the strongest since 1999.

Despite the recent acceleration in job growth, some observers are concerned about the types of jobs being added. Recent reports have suggested that, at the national level, jobs added during the expansion have typically been lower-paying than the jobs they've replaced.²

Wages are, of course, only one dimension of job quality. Other factors, such as job security, retirement benefits, health-care benefits, opportunities for advancement, and working conditions also help determine the quality of a job. Nevertheless, as one way to assess the quality of jobs being added in this expansion, we focus our analysis on average hourly earnings, updating the work of Mester and Sen (2013) and Mester and Olney (2004)³ for the U.S., and applying their approach to states in the Fourth Federal Reserve District (Ohio, Pennsylvania, Kentucky, and West Virginia). Beyond trying to assess the quality of jobs that are being added in this expansion, we will also address: (1) how patterns in the current expansion differ from earlier expansions (i.e., across time), and (2) how patterns differ in the current expansion between the U.S. and Fourth District states (i.e., across space).

¹ The views expressed here are those of the authors and do not necessarily reflect those of the Federal Reserve Bank of Cleveland or the Federal Reserve System.

² See, e.g., U.S. Conference of Mayors (2014).

³ These papers use a modified version of the Aaronson and Christopher (2004) methodology to study the employment recovery in Pennsylvania, New Jersey, and Delaware during the 2001 recovery. Because the regional data are somewhat more limited than the national data (in particular, state employment data are available for fewer industries than are the national employment data) and because the focus is on shares of private sector jobs rather than total employment (which is private sector jobs plus government sector jobs), the index of job quality used here (i.e., the difference between employment growth in industries with higher-paying jobs versus employment growth in industries with lower-paying jobs) differs somewhat from the Aaronson and Christopher index.

2. Summary of the Findings

Using 10 private-sector industry groupings, we find the following:

- In the two recessions prior to the Great Recession (1990-91 and 2001), private-sector industries with above-average hourly earnings saw larger job losses nationally than those with below-average hourly earnings.
- During the Great Recession, the opposite appears to be true, where industries with below-average earnings contributed more to the nation's job losses.
- This change is largely related to the re-classification of manufacturing, which went from having above-average to below-average hourly earnings in 2006.
- In the recoveries that followed the 1990-91, 2001, and 2007-2009 recessions, job gains among above-average paying industries contributed more to total private-sector job gains as those expansions wore on.
- Among three of the four states in the Fourth Federal Reserve District – Ohio, Pennsylvania, and Kentucky – the patterns tend to be similar to those described above for the U.S., albeit more variable.
- Nationally, in the current expansion through the end of 2014, for every job added in industries with below-average hourly earnings, about 1.3 jobs have been added in industries with above-average hourly earnings. In Fourth District states, job gains in higher-paying industries have also outpaced job gains in lower-paying industries, to the same or even greater extent than in the nation.

3. Details of the Analysis

3.1. Which industries have relatively low-paying jobs and which industries have relatively high-paying jobs?

The data on average hourly earnings are available from the Bureau of Labor Statistics. These data are limited in a number of ways. Average hourly earnings do not include nonwage compensation. The data are not available for particular types of jobs within an industry, but only as an average for production and nonsupervisory workers within the industry. Thus, the determination of whether a job added is high-paying or low-paying is based on the average hourly earnings paid for all jobs in the industry. Moreover, we do not have comparable state-level data on average hourly earnings by industry, except for manufacturing. Thus, the determination of whether a job added in our region is high- or low-paying is based on the national earnings in that industry. The underlying assumption is that earnings are determined in a national labor market.

We focus on the industry sectors defined by the North American Industry Classification System (NAICS) whose payroll employment data are available for the region.⁴ These industry sectors are:

1. Construction
2. Mining and Logging
3. Manufacturing
4. Trade, Transportation, and Utilities
5. Information
6. Financial Activities
7. Professional and Business Services
8. Education and Health Services
9. Leisure and Hospitality
10. Other Services (which includes repair and maintenance services, personal and laundry services, and membership associations and organizations).

For each month, we can classify industries into high-pay and low-pay according to whether their average hourly earnings are above or below, respectively, the national average for all private industries.⁵

Applying this ranking in December 2014 yields the following classification:

Table 1: Average Hourly Earnings by Industry, Production and Nonsupervisory Employees

	Average Hourly Earnings, (\$) Production and Nonsupervisory Employees, December 2014
Total Private Industries	20.72
High-Paying Industries	
Information	28.46
Mining and Logging	26.63
Financial Activities	25.00
Construction	24.78
Professional and Business Services	24.32
Education and Health Services	21.83
Lower-Paying Industries	
Manufacturing	19.62
Other Services	18.71
Trade, Transportation, and Utilities	18.36
Leisure and Hospitality	12.29

Source: Bureau of Labor Statistics via Haver Analytics.

Note: Data in the table are as of March 16, 2015.

⁴ The data used in this analysis are as of March 16, 2015. State payroll employment data for industries classified by the NAICS begin only in January 1990. While state data on industries classified by the Standard Industrial Classification (SIC) system have a longer history, these data were discontinued in 2002. The monthly payroll employment data are available for the four states in our region only for ten industrial sectors. This is a potential limitation of our regional analysis. Aaronson and Christopher show that the results for the nation are somewhat sensitive to the level of industry aggregation used.

⁵ When an industry's average wage equals the average wage for all private industries, we classify the industry as low-pay for the purposes of this analysis.

As discussed in Mester and Sen (2013) and as shown in **Figure 2**, since 1990 only three industries have switched pay categories. Financial activities paid below-average from January 1990 through December 1991, and then switched to above-average in January 1992. Manufacturing was above-average from January 1990 to July 2006, and switched to average or below-average in August 2006. (Note that manufacturing had been a below-average paying industry prior to the mid-1970s.) Lastly, education and health services paid average or below-average wages from January 1990 through September 1991 and from August 1997 through March 2001; it paid above-average wages from October 1991 through July 1997 and from April 2001 onward.

3.2. How is employment distributed between high- and low-paying industries?

There are a few notable differences in the industry composition of employment between the U.S. and Fourth District states (see **Figure 3**). For example, at the end of 2014, manufacturing had much higher employment proportions in Ohio and Kentucky than in the U.S. overall. By contrast, it was a smaller share of employment in West Virginia, where mining and logging absorbed a greater proportion of employment than in the other district states or the U.S. Professional and business services, however, accounted for a smaller share of employment in West Virginia than in the other district states or the nation. And finally, the fraction of employment in education and health services in Pennsylvania was well above that for the U.S. or the other district states. Despite these differences, high-pay and low-pay industries were roughly evenly divided in the U.S., Pennsylvania, and West Virginia (see **Figure 4**). Ohio had a slightly larger share of employment in low-pay industries (52.9 percent), while the gap was greatest in Kentucky, favoring low-pay industries (56.0 percent).

3.3. How have employment gains during recoveries been distributed among the high- and low-paying industry categories?

Following Mester and Olney (2004), we construct an index that measures the difference between job additions in high-paying versus low-paying industries, using the available monthly payroll employment data for the ten industrial sectors identified above.

The first index measures the difference between the change in employment in high-paying sectors as a share of total private-sector employment versus the change in employment in low-paying sectors as a share of total private-sector employment.⁶ This is equivalent to the weighted-average difference in employment growth in the high- and low-paying sectors, where the weights are the associated employment shares for these two sectors. That is:

⁶ Because earnings data are unavailable for government jobs, the index is based on high-paying and low-paying jobs as shares of private-sector employment.

$$Diff_t = \left[\left(\frac{E_{H,t} - E_{H,t-1}}{E_{H,t-1}} \right) \times \left(\frac{E_{H,t-1}}{E_{t-1}} \right) \right] - \left[\left(\frac{E_{L,t} - E_{L,t-1}}{E_{L,t-1}} \right) \times \left(\frac{E_{L,t-1}}{E_{t-1}} \right) \right]$$

where

$E_{S,t}$ = monthly employment in sector S in a given geography at month t, where S = H for high-paying industries or L for low-paying industries, where the high-paying industries are those whose average hourly earnings in month t are greater than average hourly earnings for all private-sector industries in month t, and low-paying industries are those whose average hourly earnings in month t are less than average hourly earnings for all private-sector industries in month t,

and

E_t = monthly private-sector employment in in a given geography at month t.

(Note: $E_{H,t} - E_{L,t} = E_t$.)

We then calculate the 12-month moving average of this index for the nation or a district state, that is:

$$AvgDiff_t = \frac{1}{12} \sum_{i=1}^{12} Diff_{t-(i-1)}$$

We also examine the individual components of the index for the high-pay and low-pay sectors. The index $Diff_t$ could equal zero because both high-pay and low-pay industries are adding jobs at the same rate or because they are both shedding jobs at the same rate. The individual component indexes can distinguish between these cases. These individual components represent the contribution of the high-pay and low-pay sectors to overall private-sector employment growth. That is:

$$High-pay_t = \left[\left(\frac{E_{H,t} - E_{H,t-1}}{E_{H,t-1}} \right) \times \left(\frac{E_{H,t-1}}{E_{t-1}} \right) \right]$$

and

$$Low-pay_t = \left[\left(\frac{E_{L,t} - E_{L,t-1}}{E_{L,t-1}} \right) \times \left(\frac{E_{L,t-1}}{E_{t-1}} \right) \right]$$

In addition, we compute the 12-month moving averages of these indices:

$$AvgHigh-pay_t = \frac{1}{12} \sum_{i=1}^{12} High-pay_{t-(i-1)}$$

and

$$AvgLow-pay_t = \frac{1}{12} \sum_{i=1}^{12} Low-pay_{t-(i-1)}$$

Note that

$$High-pay_t + Low-pay_t = \left(\frac{E_t - E_{t-1}}{E_{t-1}} \right)$$

= Growth in private-sector jobs in month t,

and

$$AvgHigh-pay_t + AvgLow-pay_t = \frac{1}{12} \sum_{i=1}^{12} \frac{E_{t-(i-1)} - E_{t-i}}{E_{t-i}}$$

= 12-month moving average of private-sector employment growth.

We calculated these indexes both for the U.S. and the Fourth District states.

Figure 5a plots three of the series described above for the U.S., namely *AvgHigh-pay_t*, *AvgLow-pay_t*, and *AvgDiff_t*. As noted above, adding *AvgHigh-pay_t* and *AvgLow-pay_t* gives the 12-month moving average of private-sector employment growth. For instance, in January 1991 (the first point plotted in **Figure 5a**), *AvgHigh-pay_t* equaled -0.08 percentage point and *AvgLow-pay_t* equaled 0.04 percentage point. Adding them together gives -0.04 percent, which equates to average monthly private-sector employment declines in the prior twelve months of about 38,900.

Perhaps surprisingly, *AvgLow-pay_t* is positive in January 1991 and throughout the 1990-91 recession, meaning that the associated low-pay industries were actually adding net new jobs on average over a given (trailing) twelve month window during this time. The same is true in the 2001 recession. By contrast, *AvgHigh-pay_t* is negative largely throughout the 1990-91 and 2001 recessions.

AvgDiff_t, which subtracts *AvgLow-pay_t* from *AvgHigh-pay_t*, shows the contribution differences between the two categories. When *AvgDiff_t* is positive, *AvgHigh-pay_t* exceeds *AvgLow-pay_t*, and when *AvgDiff_t* is negative, *AvgLow-pay_t* exceeds *AvgHigh-pay_t*. Because *AvgLow-pay_t* was positive in 1990-91 and 2001 recessions, and *AvgHigh-pay_t* was generally negative, *AvgDiff_t* was negative in these episodes as well. This pattern, however, did not repeat itself in the Great Recession, raising a question about whether different industry dynamics arose during this episode.

It turns out that the key driver of this shift was the change in classification of manufacturing in 2006 from high-pay to low-pay. Average hourly earnings in manufacturing have tended to be close to the average for all private-sector industries since January 1990. However, in the two earlier recessions in our analysis, manufacturing employment was classified as high-paying, and in the most recent recession and expansion it is classified as low-paying. To examine the impact of this shift, we did a counterfactual analysis re-classifying manufacturing as a high-pay industry. As seen in **Figure 5b**, in this counterfactual, $AvgDiff_t$ turns negative in the Great Recession, just as it had been in the prior two recessions. This indicates a caveat when drawing conclusions from such an analysis: one must be careful to understand the industry dynamics that are obscured by our broad categorizations of industries into high-pay and low-pay.

This caveat also applies to the states in the district, among which three of the four – Ohio, Pennsylvania, and Kentucky – show patterns similar to those described above for the U.S.. Specifically, $AvgDiff_t$ turns negative in and around the recessions of 1990-91 and 2001, but remains positive throughout the Great Recession. (In the counterfactual analysis, when manufacturing is classified as high-pay, the index also turns negative in the Great Recession, as it did in the national counterfactual analysis.). (See **Figures 6a, 6b, 7a, 7b, 8a, and 8b**.) These state indexes show somewhat more variability than their U.S. counterparts. This variability is most evident in the indexes for West Virginia (**Figures 9a and 9b**), where it is difficult to detect a clear pattern.

One way to look through this variability is to consider cumulative employment changes over the Great Recession and in the expansion that has followed. One of the concerns about the recent expansion is that employment gains have come largely from lower-paying industries. But **Table 2** indicates that these concerns are misplaced. In fact, during this expansion, there have been greater job gains in higher-paying industries than in lower-paying industries, nationally as well as in Fourth District states. Nationally, high-pay industries have added almost 5.9 million jobs in the expansion through the end of 2014, versus about 4.4 million for low-pay industries. This equates to about 1.3 high-pay jobs added for every low-pay job added. In Ohio and Kentucky, the ratio is about 1 to 1, while in Pennsylvania, it's about 1.5 to 1. In West Virginia, higher-paying industries have accounted for all of the net new jobs created during the expansion through the end of 2014.

4. Conclusions

There are several caveats to this analysis. Job quality entails more than just earnings. Average hourly earnings for most industries are not available on a state level, so the classification of jobs into high-paying and low-paying may not be strictly applicable to the states in the Fourth Federal Reserve District, to the

extent that the distribution of earnings across industries differs across regions. The NAICS employment data by state are available only from January 1990 onward, so we can analyze state-level differences only for recent business cycles. We have limited our analysis to the ten industry sectors available for our region. Using a greater number of sectors would reduce the distortions resulting from combining different jobs within one category. The methodology does not distinguish between jobs that pay well above the industry average and those that pay only a little above the industry average. Similarly, it does not distinguish between jobs that pay well below and those that pay only a little below the industry average. And as noted above, industries can switch categories, which must be considered when looking at the time series.

Despite these caveats, our analysis suggests that though job gains took time to materialize in the current expansion, they have not been biased toward lower-paying industries. On the contrary, from the beginning of the expansion through the end of 2014, at the national level, for every job added among lower-paying industries, there have been about 1.3 jobs added among higher-paying industries. In addition, for the four states in the Fourth Federal Reserve District, job gains among higher-paying industries have also outpaced job gains in lower-paying industries, to the same or even greater extent than in the nation.

References

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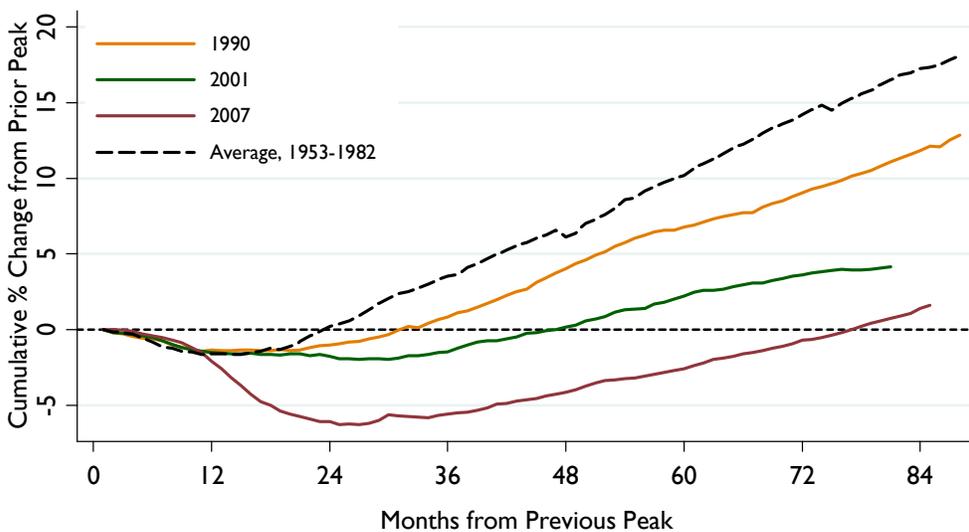
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Figure 1

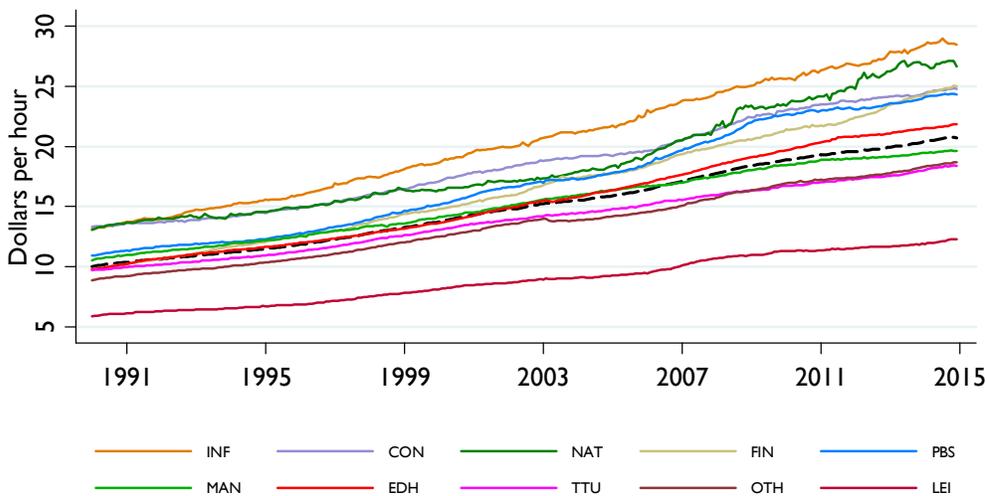
US Payroll Employment Percent Change from Previous Peak



Last data point: 12/2014.

Figure 2

Average Hourly Earnings US, Private Industries, Production & Nonsupervisory Employees



1) Last data point: 12/2014.
2) Total shown by dashed black line.

Source: Bureau of Labor Statistics via Haver Analytics.
Note: Data in the figures are as of March 16, 2015.

Figure 3

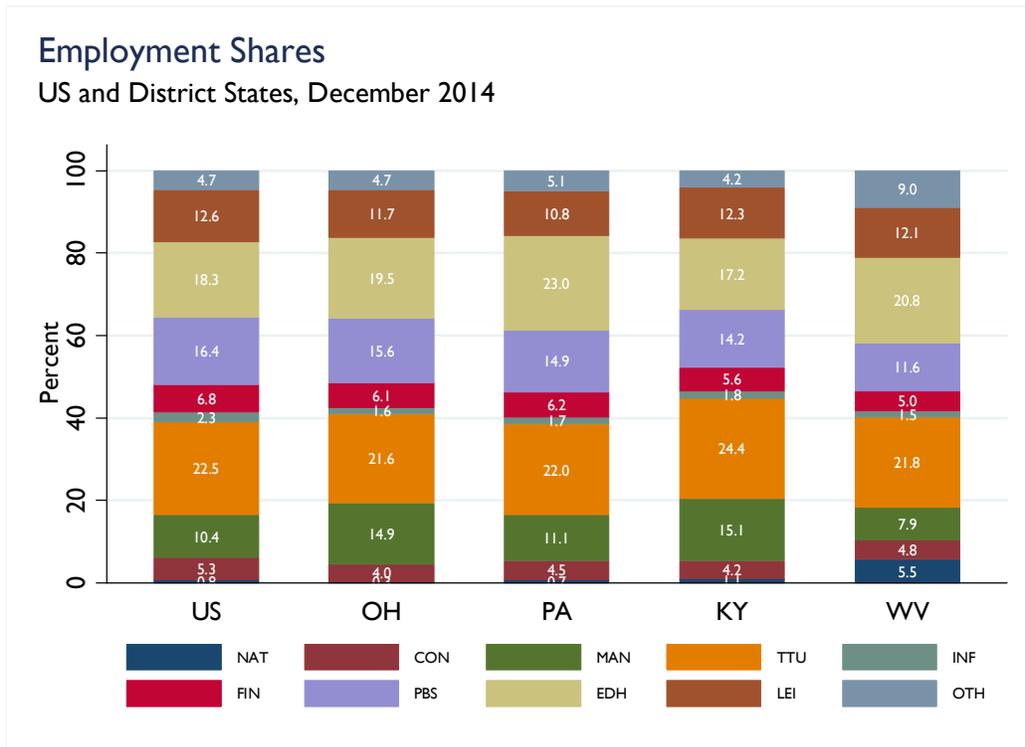
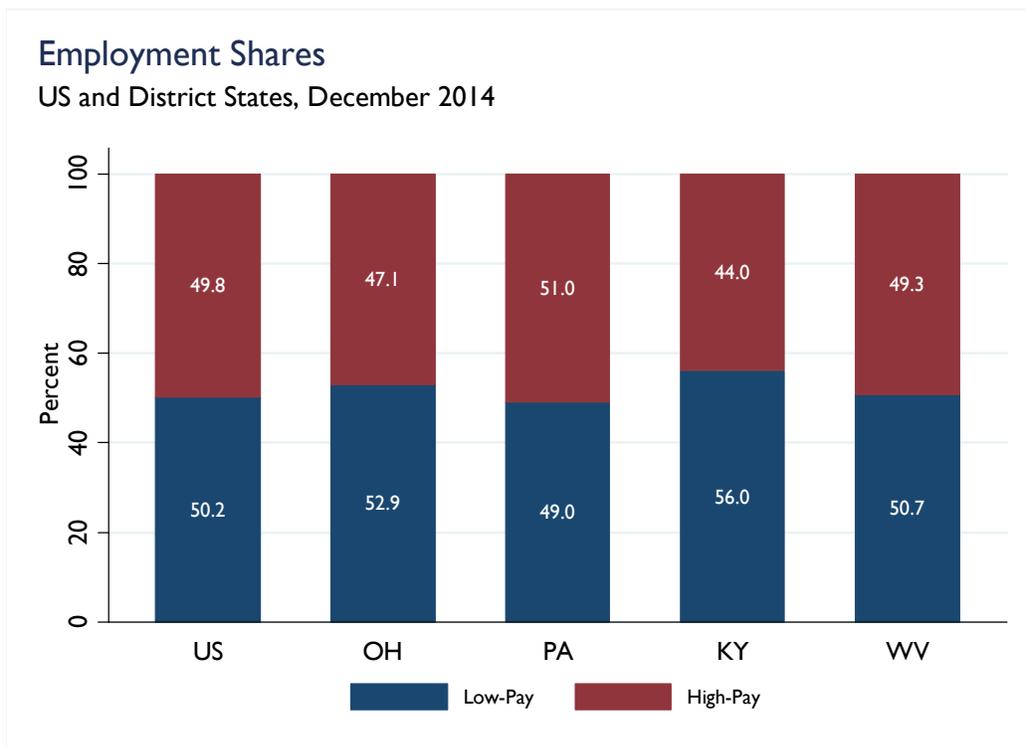


Figure 4



Source: Bureau of Labor Statistics via Haver Analytics.
 Note: Data in the figures are as of March 16, 2015.

Figure 5a

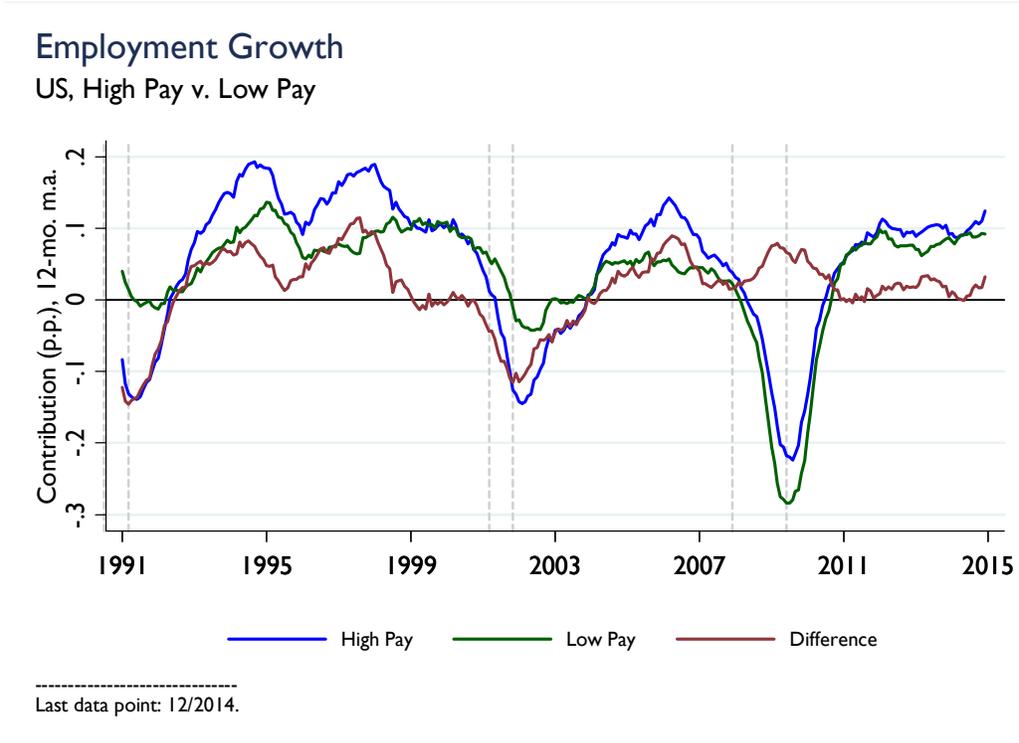
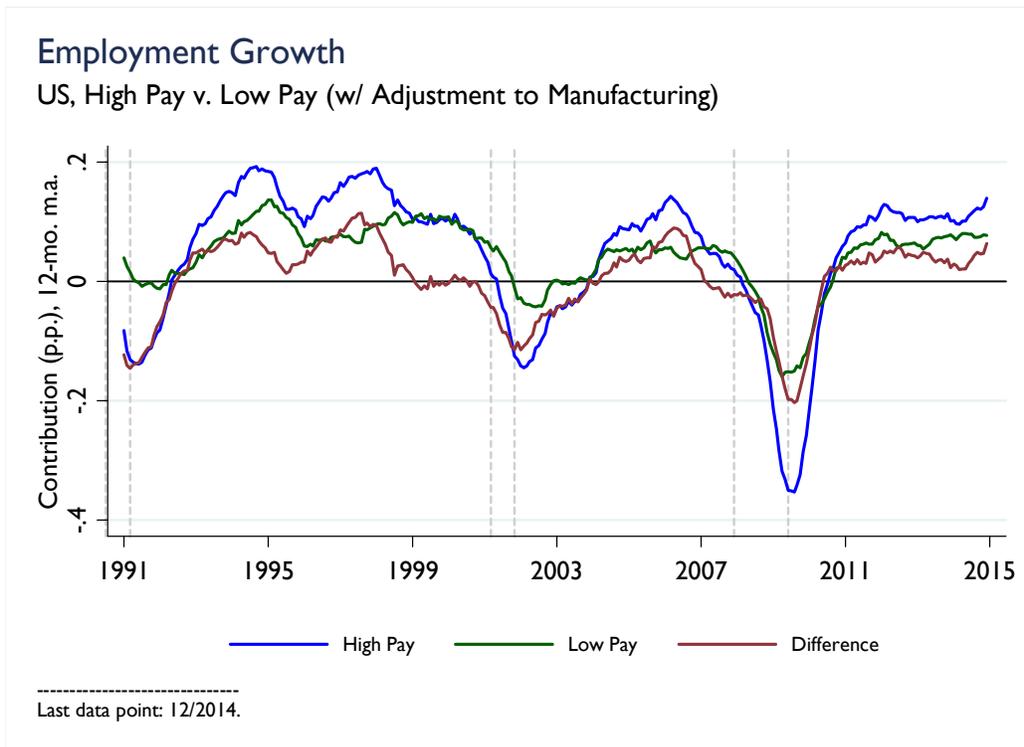


Figure 5b



Source: Bureau of Labor Statistics via Haver Analytics.
Note: Data in the figures are as of March 16, 2015.

Figure 6a

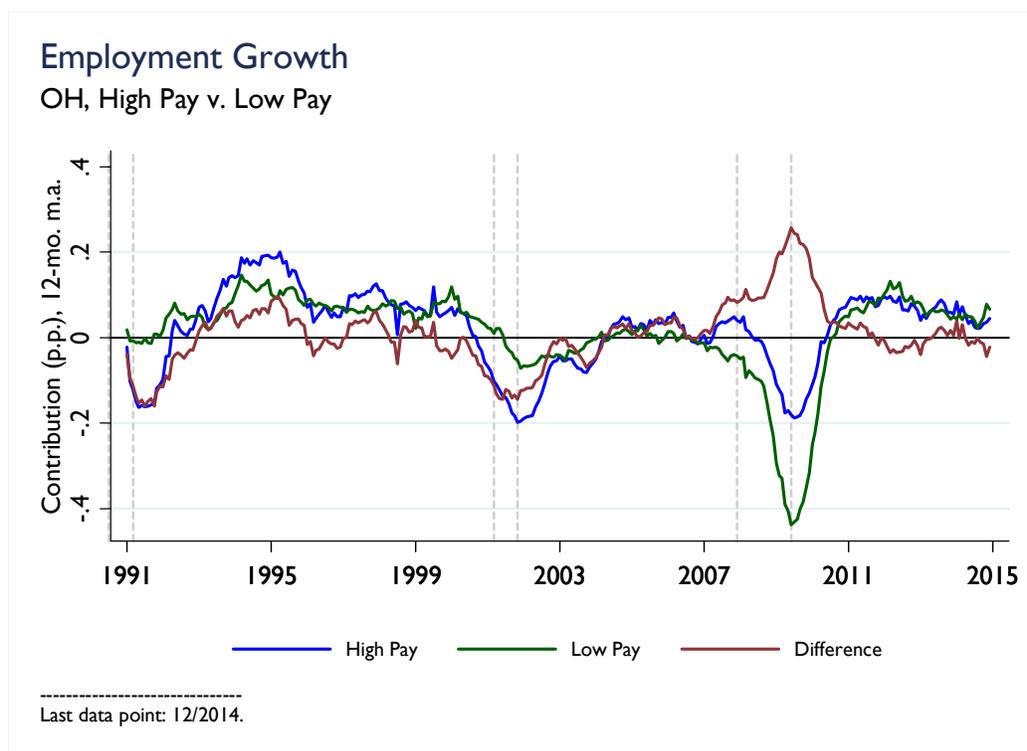
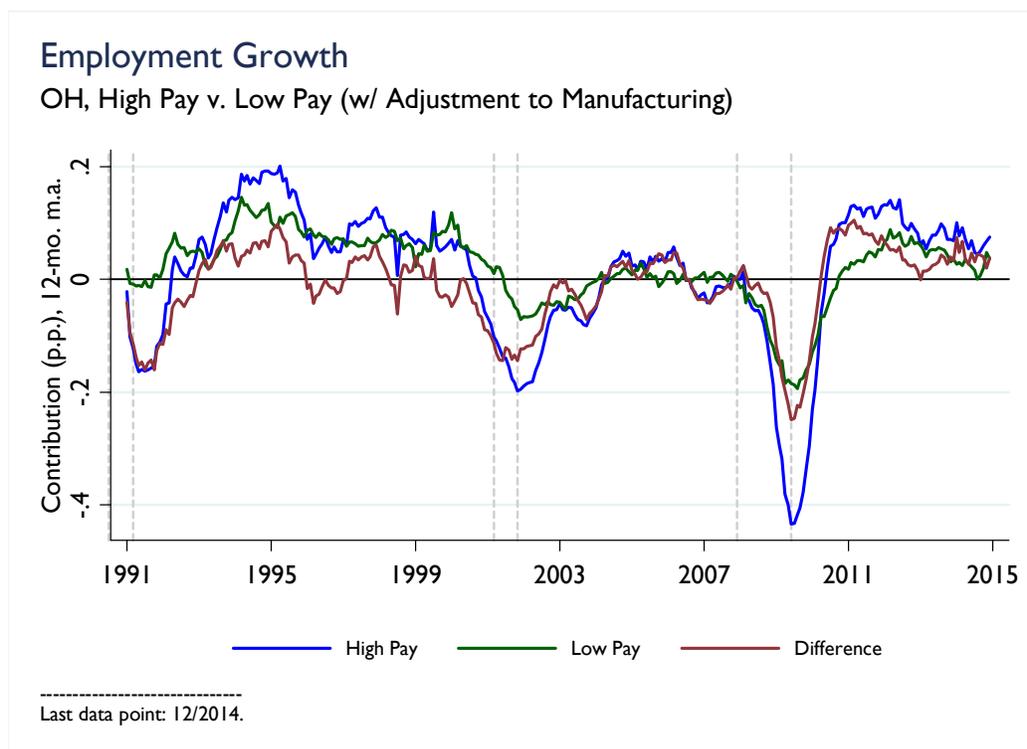


Figure 6b



Source: Bureau of Labor Statistics via Haver Analytics.
Note: Data in the figures are as of March 16, 2015.

Figure 7a

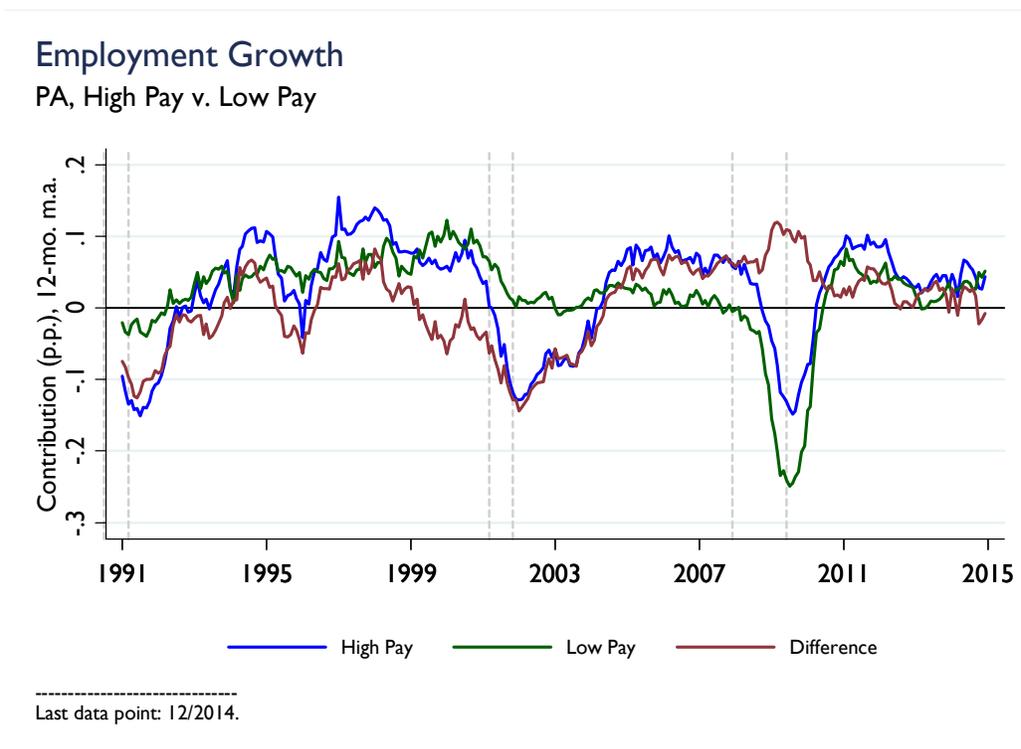
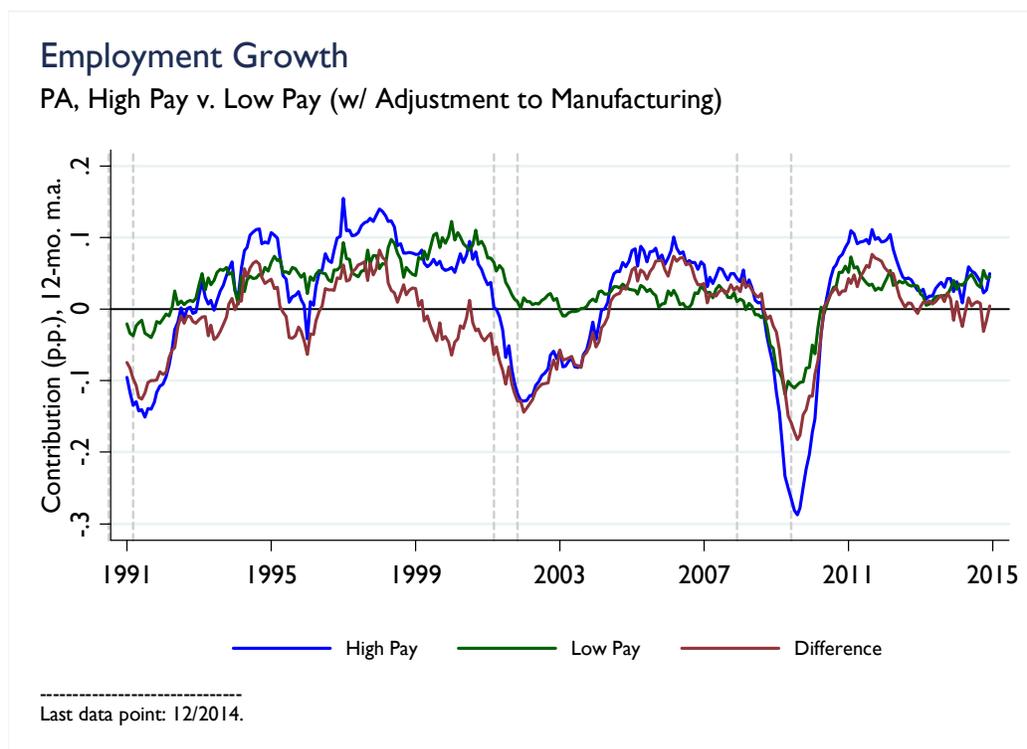


Figure 7b



Source: Bureau of Labor Statistics via Haver Analytics.
Note: Data in the figures are as of March 16, 2015.

Figure 8a

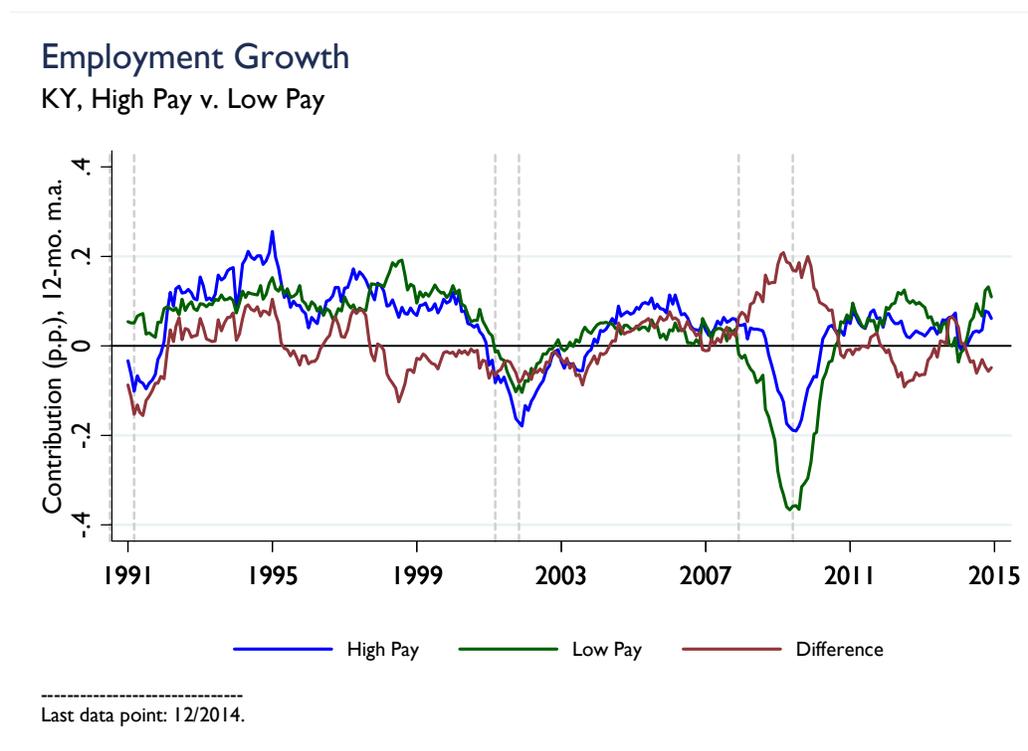
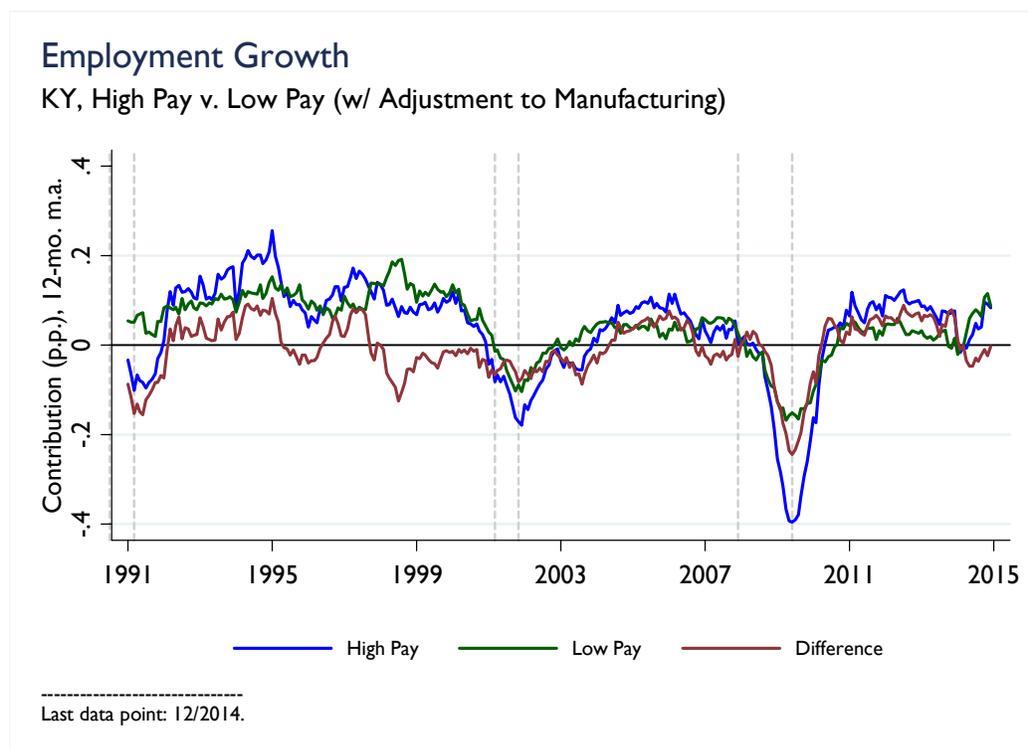


Figure 8b



Source: Bureau of Labor Statistics via Haver Analytics.
Note: Data in the figures are as of March 16, 2015.

Figure 9a

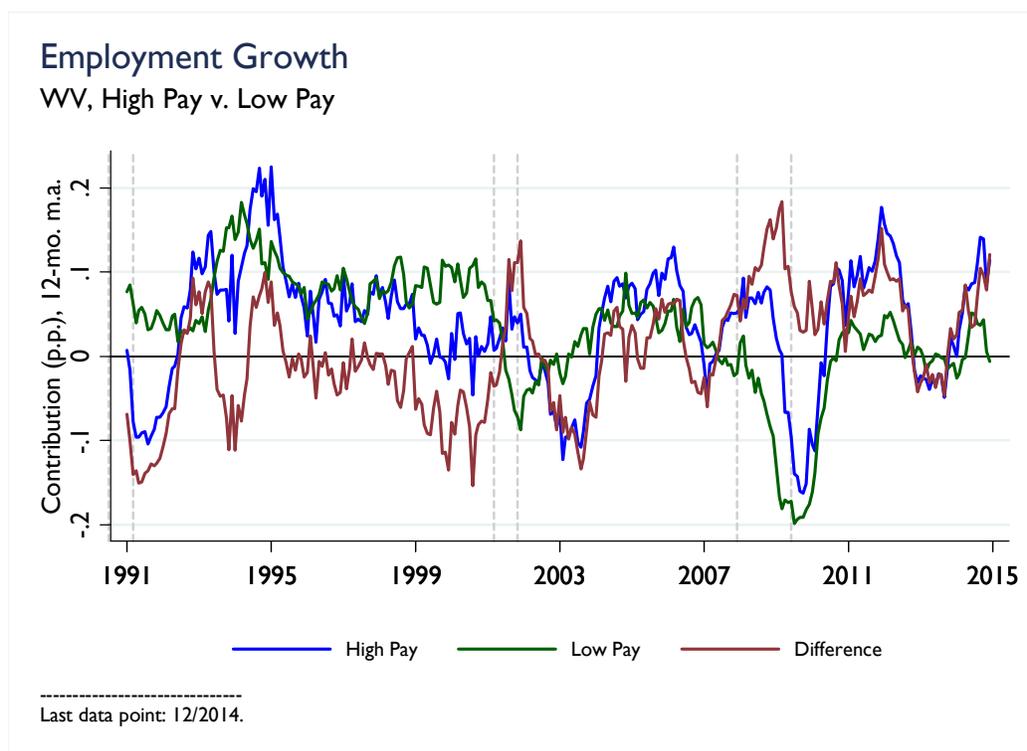
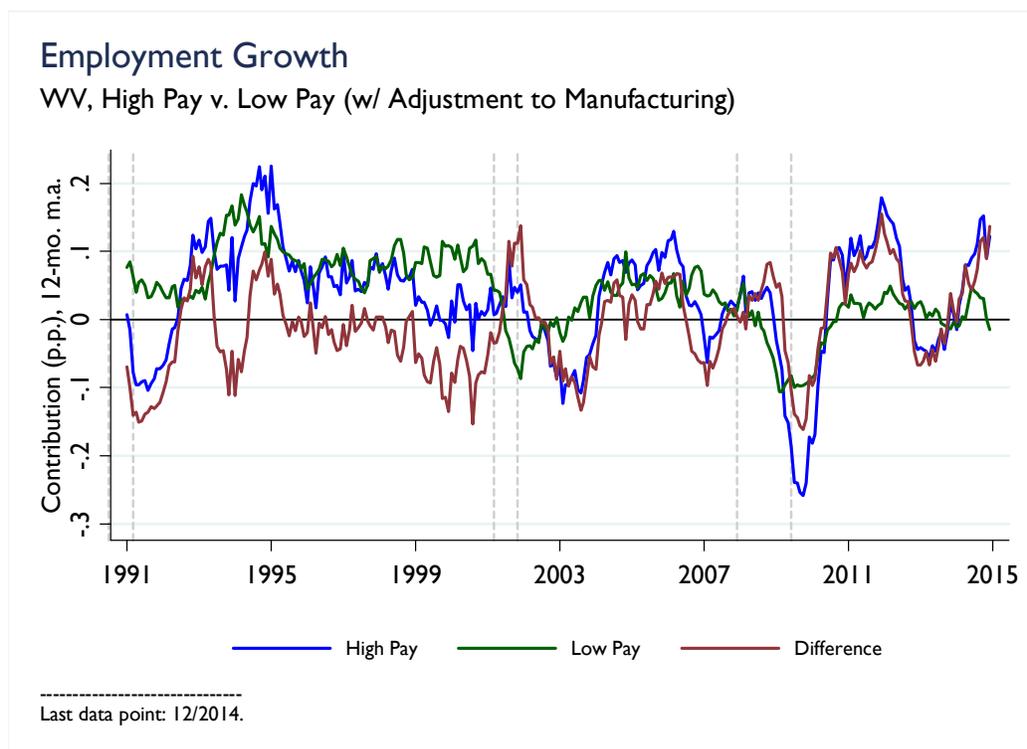


Figure 9b



Source: Bureau of Labor Statistics via Haver Analytics.
Note: Data in the figures are as of March 16, 2015.

Table 2: Cumulative Change in Private-Sector Employment (000s) during the Great Recession and Current Expansion

	US	OH	PA	KY	WV
Recession					
Total	-7606	-370.4	-223.0	-104.9	-19.6
<i>Unadjusted</i>					
High-Pay	-3162	-103.0	-66.5	-30.6	-3.9
Low-Pay	-4444	-267.4	-156.5	-74.3	-15.7
<i>W/ Adj. to Mfg.</i>					
High-Pay	-5182	-252.1	-153.9	-72.0	-11.6
Low-Pay	-2424	-118.3	-69.1	-32.9	-8.0
Expansion					
Total	10322	321.6	262.9	99.8	23.0
<i>Unadjusted</i>					
High-Pay	5875	164.3	155.9	50.1	23.3
Low-Pay	4447	157.3	107.0	49.7	-0.3
<i>W/ Adj. to Mfg.</i>					
High-Pay	6450	235.3	153.3	71.7	22.1
Low-Pay	3872	86.3	109.6	28.1	0.9

Source: Bureau of Labor Statistics via Haver Analytics.

Note: Data in the table are through December 2014, as of March 16, 2015.