The CES/JOLTS Divergence: How to Apply the Monthly Alignment Method to Help Close the Gap

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2 Massachusetts Avenue, NE Washington, DC 20212-0001 October 2009

Abstract

Both the Job Openings and Labor Turnover Survey (JOLTS) and the Current Employment Statistics (CES) survey are conducted on a monthly basis by the U.S. Bureau of Labor Statistics. The data collected by each of these surveys differs in that JOLTS focuses on: number of job openings, hires, quits, layoffs and discharges, and other separations; while, CES focuses on employment, hours, and earnings of workers on nonfarm payrolls. Conceptually, the difference between JOLTS hires and separations should be very similar to the CES net employment change, but over its history the implied JOLTS series has exhibited a large and growing divergence from CES trends. As a result, a monthly alignment method based on seasonally adjusted JOLTS and CES data was developed, which mitigates the diverging trends between the series while preserving their seasonality.

Key Words: JOLTS, CES, Employment, Monthly Alignment Method, Seasonal Adjustment

1. The CES/JOLTS Divergence Problem

The Bureau of Labor Statistics (BLS) Job Openings and Labor Turnover Survey (JOLTS) collects data on employment and focuses on job openings, hires, and separations from a sample of approximately 16,000 business establishments. The Current Employment Statistics (CES) Survey, also conducted by the BLS, is one of the first major monthly economic indicators of current US economic conditions. The CES program provides an array of detailed industry data on employment, hours, and earning of workers in nonagricultural industries by surveying approximately 390,000 business establishments.

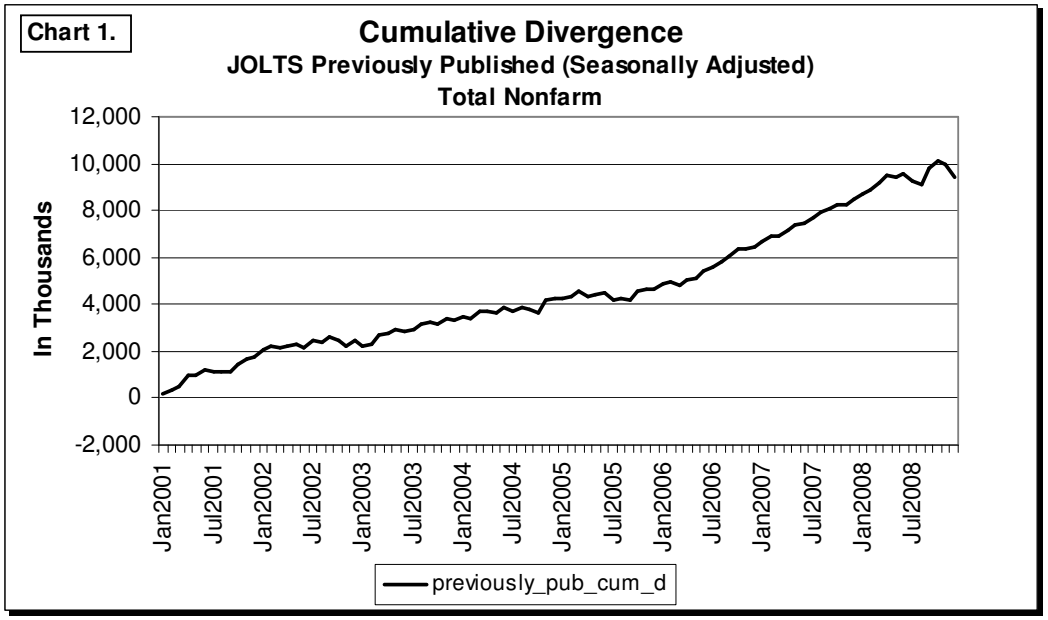
Over a twelve month period, the difference between JOLTS hires and separations (HI-SEP) ought to be, theoretically, comparable to the CES net employment change. However, over its history the implied JOLTS series has demonstrated a large and growing divergence from CES trends. Earlier studies on the JOLTS and CES monthly trend differences concluded number of definitional and reporting dissimilarity which could affect the statistics measurement relationship resulted from the two surveys (Wohlford, Phillips, Clayton, and Werking 2003).

Chart 1 illustrates the growing discrepancy between the CES employment trend and the JOLTS HI-SEP implied employment trend at the total nonfarm level, which grew to approximately nine million (out of one hundred and twenty million total nonfarm employment) from beginning of 2001 to end of 2008. The cumulative divergence (D_{cum}) is calculated as follows:

$$(1) \quad D_{cum} = \sum_{i=1}^{n} D_i$$

$$(2) \quad D_i = \left(\left(HI_{est,i} - SEP_{est,i} \right) - CesEmp_{(i-(i-1))} \right)$$

Where: D = *divergence*
est = *initial estimate*
i = *month*
HI = *hires*
SEP = *separations*
$CesEmp_{(i-(i-1))}$ = *CES net employment change*



Given the monthly survey sample size for CES program of 390,000 establishments is relatively larger than JOLTS program of 16,000 establishments (Crankshaw and Stamas, 2000). In additional, CES employment methodology incorporates a business birth/death model as well as annual benchmarks to the Quarterly Census of Employment and Wages (QCEW) universe counts, it seems that the growing divergence problem originates from the JOLTS program rather than the CES program. To mitigate this growing divergence, the Monthly Alignment Method was developed.

2. Methodology

The JOLTS hires and separations can be described as a flow series, which means, the value for a reference period is based strictly on activity within that time period, in this case a month. On the other hand, the CES employment is described as a stock series because the value for a reference period is based on cumulative activity up to and including the current time period. Furthermore, CES defines employment as those persons who worked during, or received pay for, any part of the pay period that includes the 12th of the month, while JOLTS counts those persons who were hired or separated during the reference month (CES, JOLTS).

These definitional differences result in differing seasonal patterns. For this reason the Monthly Alignment Method (MAM) uses the seasonally adjusted CES employment trend to align the seasonally adjusted JOLTS implied employment trend. In addition, the MAM takes advantage of the fact that the CES employment series for the current reference month is available to be applied to the JOLTS data, allowing JOLTS to stay aligned with CES each month. As a result, the CES employment trend aligns the JOLTS implied employment trend to be approximately the same, while preserving the JOLTS seasonality.

The methodology of the MAM can be explained in several steps. First, the difference between the seasonally adjusted CES net employment change and the JOLTS HI-SEP series is calculated (2), this is the trend adjustment needed or the divergence (D). Next, the JOLTS seasonally adjusted HI-SEP is forced to equal the seasonally adjusted CES net employment change, through a proportional adjustment (3,4). Meaning, each of the two components is adjusted in proportion to its contribution to the D . Finally, the adjusted hires and separations (5,6) resulting from the proportional adjustment are then converted back to not seasonally adjusted data by reversing the application of the original seasonal factors (7,8), which are produced by X-12-ARIMA seasonal adjustment software (http://www.census.gov/srd/www/x12a/). Formula's (7) and (8) are calculated similarly when a multiplicative adjustment is used.

(3) $$PropAdj_{i,HI} = \frac{HI_{est,i}}{HI_{est,i} + SEP_{est,i}} x D_i$$

(4) $$PropAdj_{i,SEP} = \frac{SEP_{est,i}}{HI_{est,i} + SEP_{est,i}} x D_i$$

(5) $$HI_{adj,sa,i} = HI_{est,i} - \text{Prop}Adj_{i,HI}$$

(6) $$SEP_{adj,sa,i} = SEP_{est,i} + \text{Prop}Adj_{i,SEP}$$

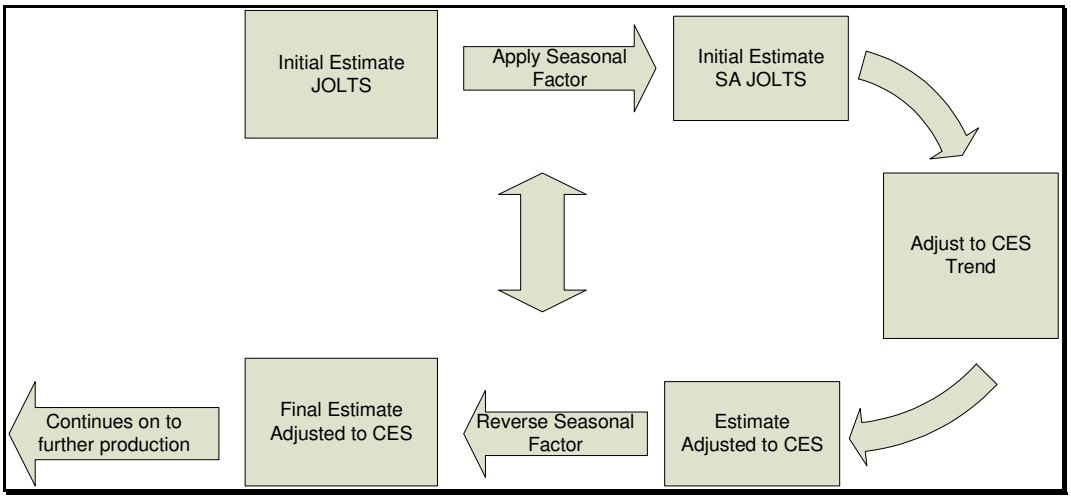
(7) $$HI_{adj,nsa,i} = HI_{adj,sa,i} + SF_i$$

(8) $$SEP_{adj,nsa,i} = SEP_{adj,sa,i} + SF_i$$

Where:

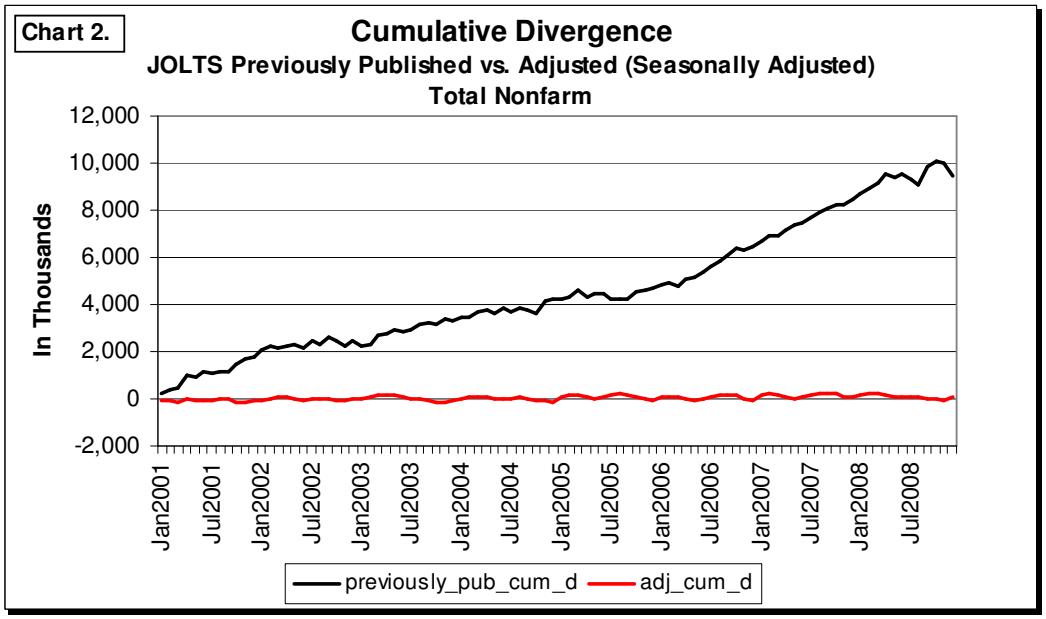
adj = adjusted to ces
nsa = not seasonally adjusted
sa = seasonally adjusted
SF = seasonal factor
PropAdj = proportional adjustment

A proportional ratio to the hires and separations is used to adjust the levels for all other JOLTS data elements. The Adjustment process is also demonstrated in the diagram below.

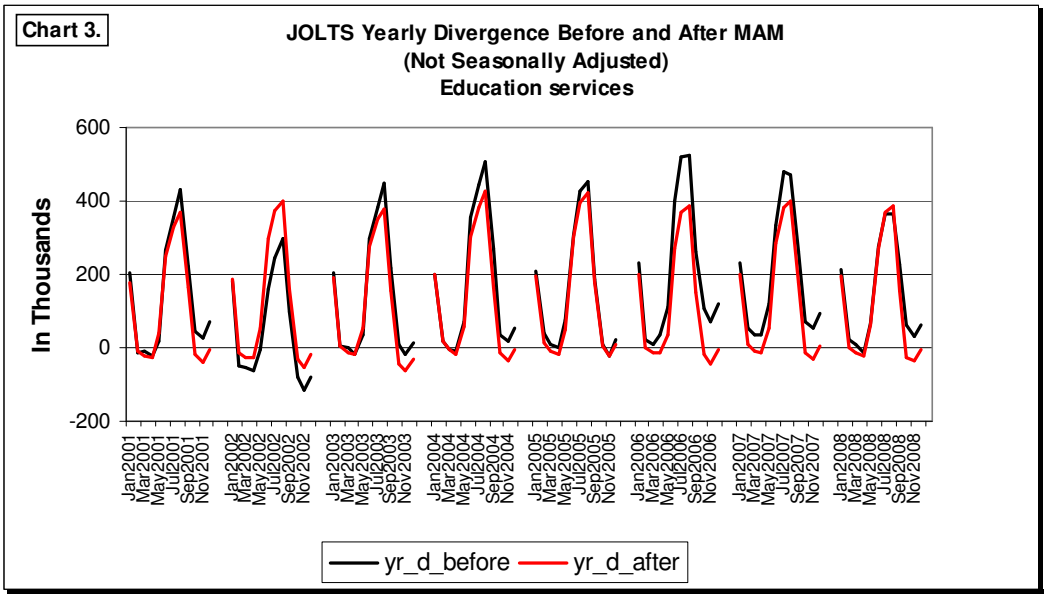


3. Results

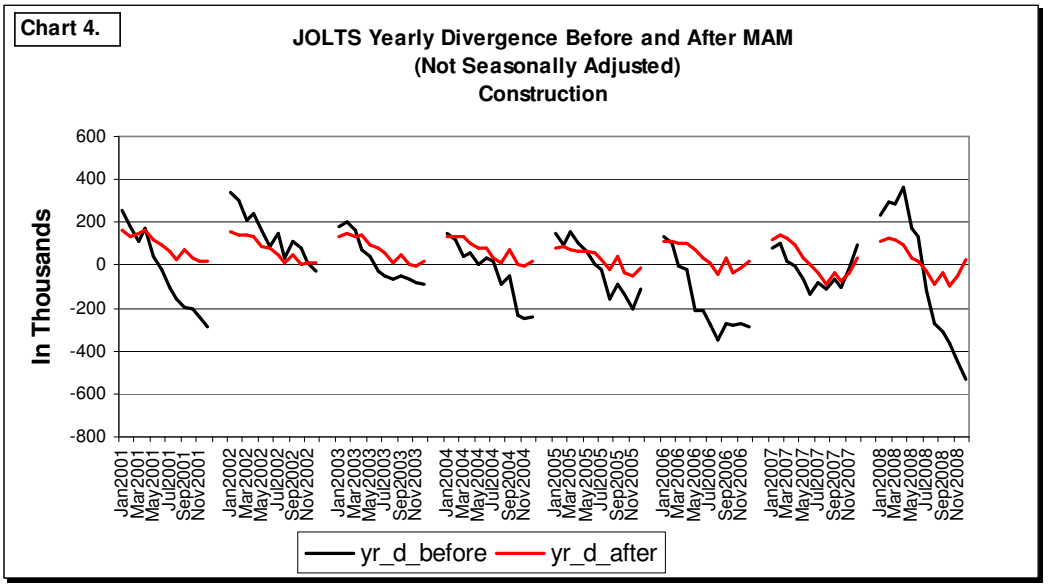
As can be seen in Chart 2, when applied to total nonfarm data, the MAM adjusts the JOLTS HI-SEP implied employment trend and closes the gap between CES and JOLTS considerably.



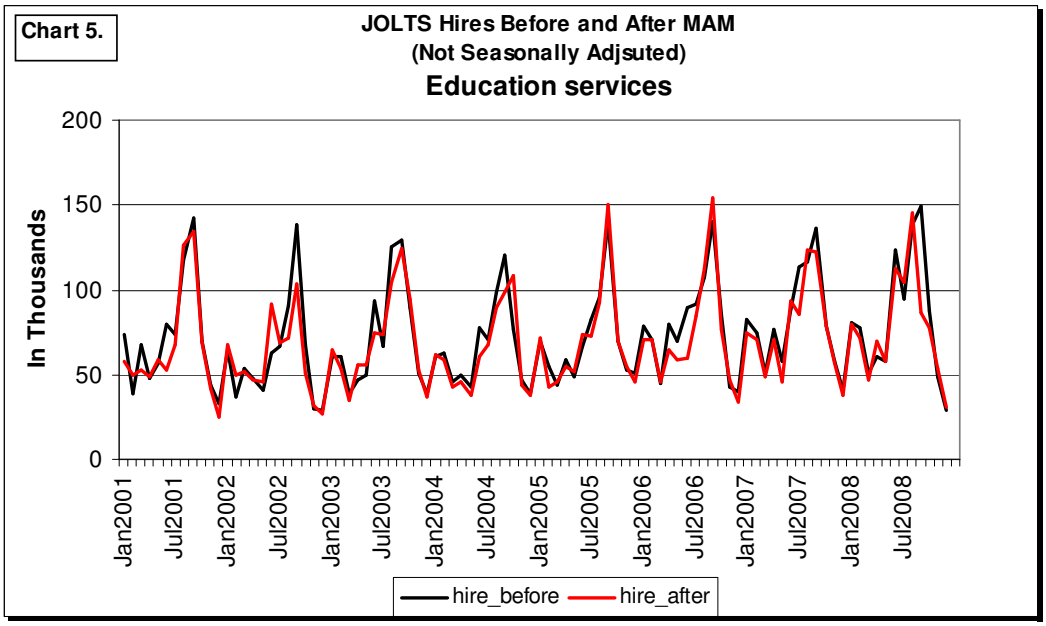
It is important to note that the MAM preserves seasonal patterns within industries while also significantly diminishing the cumulative divergence. Education Services is an industry where the yearly cumulative difference is small; therefore, the adjustment from the alignment procedure is small. As chart 3 illustrates the yearly divergence before and after the MAM are both fairly close to zero.

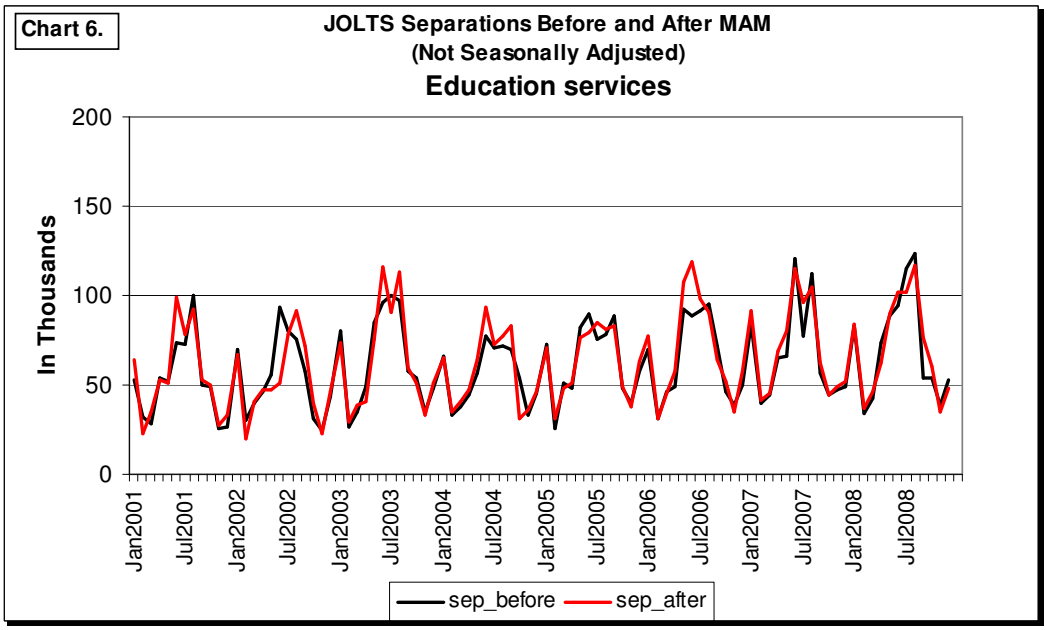


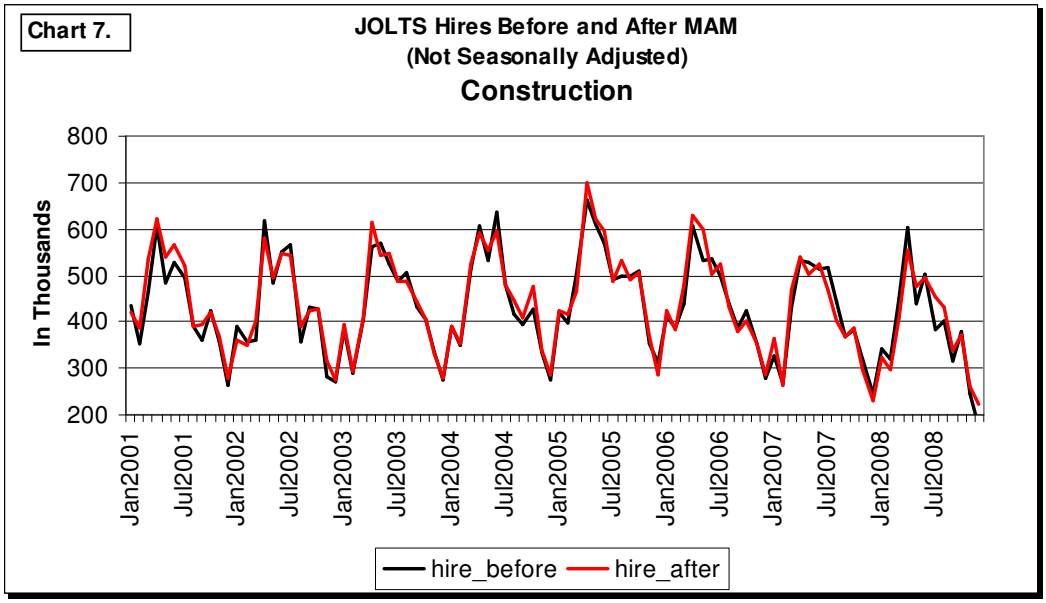
On the other hand, Construction is an industry which has a large yearly cumulative difference; therefore, the adjustment from the alignment procedure is large. As can be seen in Chart 4, large gaps are produced for years where the yearly divergence was rather large and then adjusted close to zero. These two industries demonstrate that the MAM only produces a large adjustment where a large cumulative divergence exists.

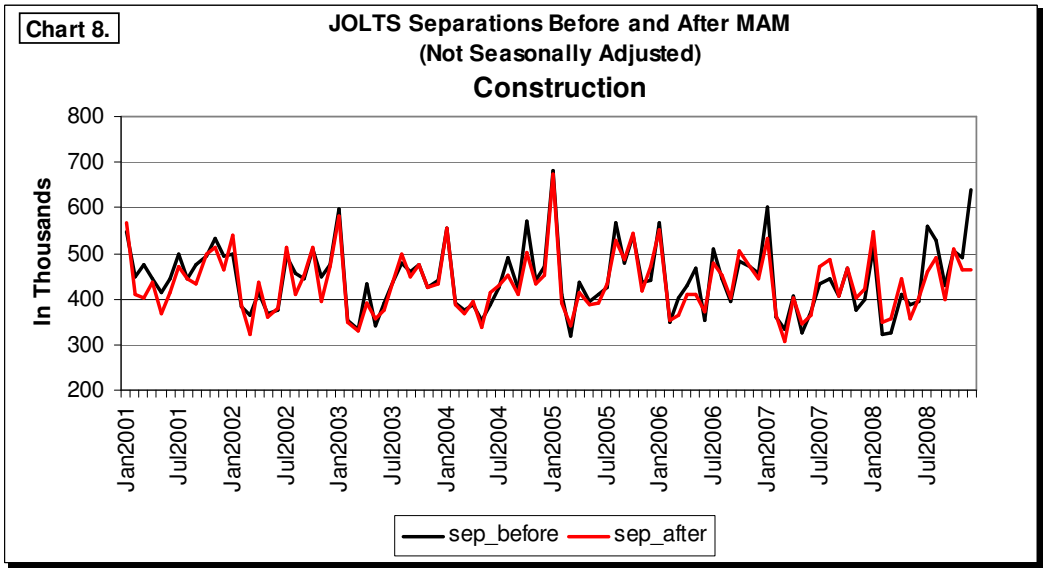


Furthermore, as can been seen in charts 5 through 8, the hires and separations levels for the Education Services and Construction industries show the same seasonal patterns before and after the adjustment; illustrating that the seasonality of these industries is preserved regardless of whether the adjustment from the alignment to CES was large or small.









Consistent with previous charts, the simple correlation coefficients in Table 1 show that the adjusted estimates follow patterns mostly in accord with the unadjusted estimates. They dip as low as .90 or .91 for a few series, including Construction Separations.

Table 1. Pearson correlation coefficients between Production and Adjusted Hires and Separations Level, January 2001 - December 2008 (Not Seasonally Adjusted)		
	Hires	**Separations**
Total	0.99	0.99
Total private	0.99	0.99
Mining and logging	0.91	0.92
Construction	0.97	0.90
Manufacturing	0.97	0.97
Durable goods	0.96	0.96
Nondurable goods	0.94	0.95
Trade, transportation, and utilities	0.98	0.99
Wholesale trade	0.95	0.95
Retail trade	0.98	0.99
Transportation, warehousing, and utilities	0.92	0.93
Information	0.95	0.98
Financial activities	0.96	0.98
Finance and insurance	0.94	0.98
Real Estate and rental and leasing	0.91	0.95
Professional and business services	0.91	0.94
Education and health services	0.97	0.98
Education services	0.91	0.92
Health care and social assistance	0.98	0.99
Leisure and hospitality	0.98	0.98
Arts, entertainment, and recreation	0.93	0.97
Accommodation and food services	0.98	0.98
Other services	0.93	0.94
Government	0.98	0.97
Federal	0.93	0.96
State and local	0.98	0.97

4. Conclusion

The implementation of the Monthly Alignment Methodology was designed to improve and more closely align the JOLTS hires and separations estimates with the monthly employment change, as measured by the CES program. The use of current monthly CES employment trends to align the JOLTS implied employment trends allows the series to depict the current labor market more accurately. The results presented in this analysis demonstrate that the MAM significantly affects the JOLTS series only when a large divergence to the CES trend is present and maintains the seasonality of the original JOLTS series. However, the use of this method does not entirely eliminate the divergence; this method was designed only to minimize the divergence. As other program improvements (see http://www.bls.gov/jlt/methodologyimprovement.htm) continue to close the employment trend differences between JOLTS and CES statistics series, the influence of the MAM on the JOLTS estimates will diminish over time

5. References

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