



Assessing Labor Market Conditions Across Regions

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Introduction

Community leaders, policymakers, and firms pay close attention to the health of their local labor markets, but with the array of indicators available, assessing labor market health can be challenging. Many individual measures are unable to paint a holistic picture of the labor market. For example, a low unemployment rate may seem to signal a strong labor market where few workers are unemployed. However, if labor force participation is also low, the labor market may be less robust than the unemployment rate alone would suggest. Moreover, the unemployment rate may evolve independently from wages or hours worked—variables that community leaders and policymakers may also care about.

While some holistic measures such as the Kansas City Fed Labor Market Conditions Indicators (LMCI) are available, they summarize national, rather than region-specific labor market data. The health of regional labor markets may vary substantially from the national trend, especially if they are heavily concentrated in particular industries or if the demographics of their workforces differ from the national average. Overall, summarizing the state of a local labor market and comparing its evolution over time is difficult if not done systematically and with region-specific measures.

In this article, we combine information from a variety of labor market data series to create measures of regional labor market health. Specifically, we construct series similar to the KC Fed LMCI for the nine U.S. Census Bureau-defined geographical divisions and call these series the DIV-LMCI. We find that the DIV-LMCI effectively capture variation in divisional labor markets and can be

interpreted similarly to the national LMCI series. We also find that the DIV-LMCI pick up some region-specific departures from the national trend. Our results suggest the DIV-LMCI may be useful not only for region-specific analysis, but also for providing a more nuanced picture of the national U.S. labor market. Furthermore, future practitioners may be able to use our framework to create LMCI series for different geographic delineations or demographic characteristics.

Section I provides background on the Kansas City Fed LMCI, describes why we construct our regional series at the Census-division level, and details how we create the DIV-LMCI series. Section II shows the DIV-LMCI can be interpreted much like the national LMCI by examining the relationship between the divisional LMCI series and our input labor market variables and comparing these relationships to the corresponding ones at the national level. Section III looks at the DIV-LMCI series over time and highlights periods where divisions have diverged.

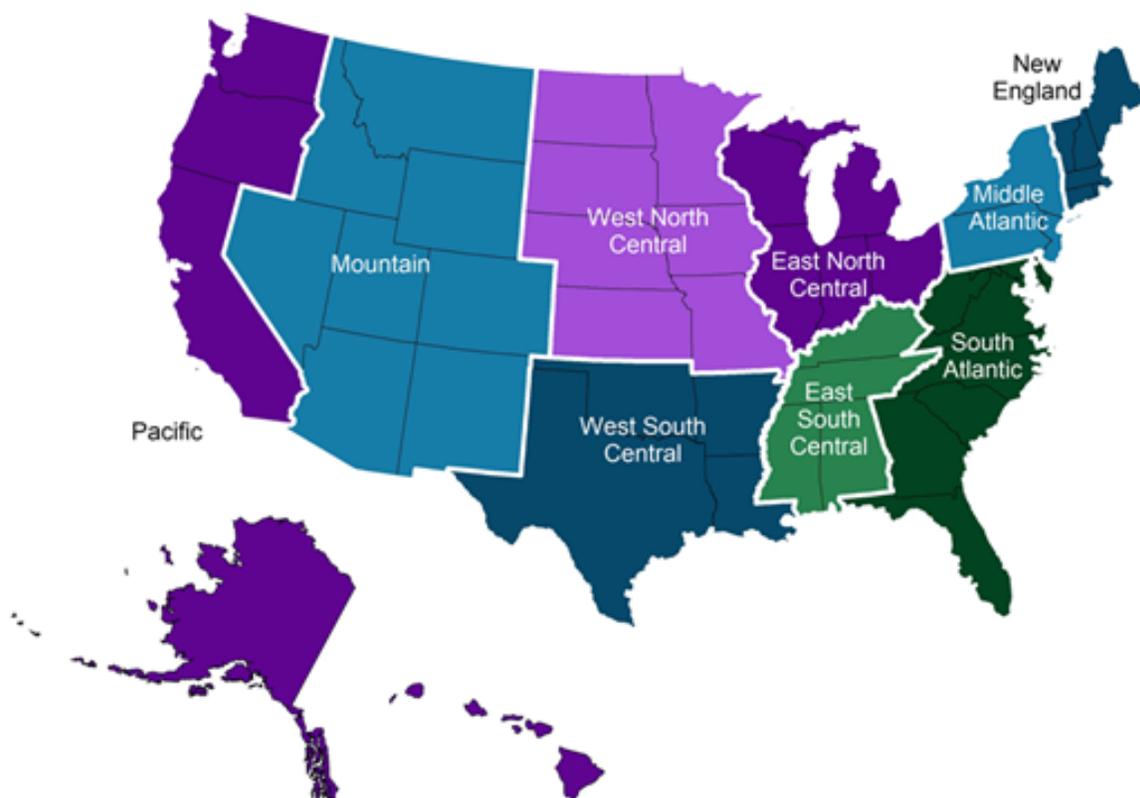
I. Constructing the DIV-LMCI Series

Assessing the state of any labor market—national or local—is challenging given the wide variety of measures available. Although measures of activity such as the unemployment rate or labor force participation are useful, they only capture the number of workers unemployed or participating in the labor market. Similarly, measures of wages only reflect labor market experiences among the employed. Even if all available labor market measures are examined, interpreting the distinct signals of each variable is a complicated task.

Hakkio and Willis (2014) document an approach for using statistical tools to combine distinct signals from a variety of labor market variables into two measures of labor market health at the national level. Their Labor Market Conditions Indicators (LMCI) consist of a *level of activity* indicator, which is related to measures of labor market activity and inactivity and thus may provide information on the current state of the labor market, and a *momentum* indicator, which is related to measures of labor market change and may provide information on where the labor market is heading.

To capture labor market health at a regional level, we follow the methodology of Hakkio and Willis (2014) to create similar series as the LMCI for the nine Census Bureau-defined geographical divisions, shown in Map 1. While not as granular as states, the nine Census divisions provide

Map 1: U.S. Census Divisions



Source: U.S. Census Bureau.

meaningful delineations to start examining regional differences in labor markets across the United States.

The nine Census divisions first appeared close to their present form (minus Alaska and Hawaii) in the 1910 decennial census, and a variety of data series have been available at this level ever since. Their ubiquity makes them a good choice for our regional LMCI series: Not only can we get almost all the labor market data we need at the division level, but many other data series—such as the Consumer Price Index (CPI), a commonly used measure of prices—are also available at the division level, making divisions a common level of analysis.

While we select Census divisions as our level of analysis, the methodology we use is general enough to be applied to wider or narrower geographies (such as states or Census regions), as well as other labor market delineations (such as industries or occupations).^[1] However, we eschew state-level analysis because many of the input series used in the original LMCI are either not available at this level of disaggregation or are extremely noisy for smaller states. For any chosen delineation, the main constraint is data availability and quality.

To construct division-level labor market indicators, we follow Hakkio and Willis (2014) and use a statistical technique called principal component analysis (PCA). PCA is used to distill information from many variables into a smaller set of variables called *principal components*, often referred to as *factors*. Each factor is essentially a weighted average of the variables used in the analysis; consequently, we can construct time series of the factors based on the time series of the input variables.

For our input data, we attempt to collect the same series used by Hakkio and Willis (2014) but at the Census division level. Hakkio and Willis (2014) use 24 labor market series as inputs into PCA. These include measures of unemployment, participation, wages, and survey expectations from workers and firms. Although some of these data series are not readily available at the division level, we can substitute in closely related series or construct identical regional series from microdata. For example, the original LMCI includes the total private quits rate, which is not available at the division level; as a result, we use the total quits rate for public and private workers in our analysis. For other variables, we calculate division-level series from Current Population Survey microdata. Additionally, some variables also require forecasting or backcasting to match the time frame of the original LMCI.

We cannot obtain, construct, or find a close substitute for three variables used in the original LMCI at the division level: Blue Chip's four-quarter-ahead unemployment rate forecast, the Institute for Supply Management's (ISM) manufacturing employment index, and the University of Michigan's expected job availability index. Rather than impute these series using their national values, we exclude them to ensure all series are division-specific, leaving us with 21 input series for each division.^[2] Excluding these series helps ensure that any co-movement between divisional series is not by construction.

We perform PCA for each of the nine division-specific labor market data sets, and following Hakkio and Willis (2014), we use the first two factors produced by PCA as our division-specific labor market conditions indicators, or DIV-LMCI.^[3] As is the case for the national LMCI, the indicators run from 1992 to present. Each indicator has a mean of zero and a standard deviation of one, allowing us to relate their values to their longer-run averages.

II. Interpreting the DIV-LMCI

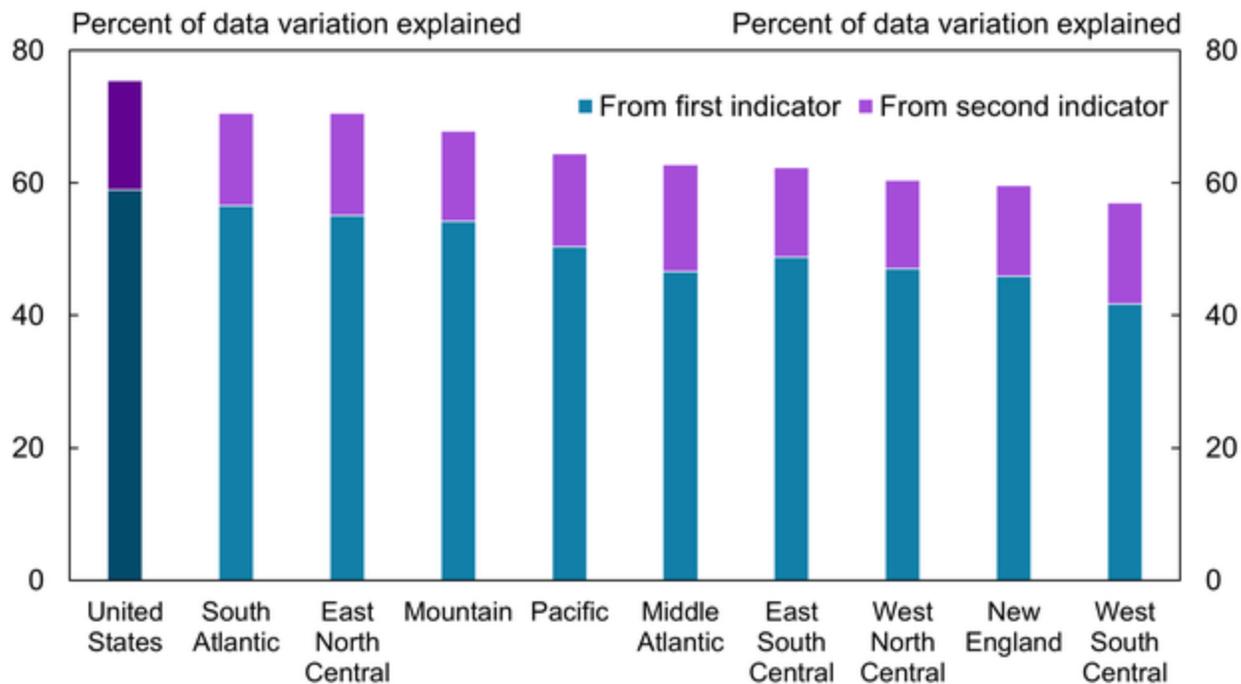
Although applying PCA to national data delivers two meaningful indicators—the level of activity and momentum—the methodology from Hakkio and Willis (2014) may not necessarily yield the same result at the division level.^[4] Therefore, we perform two exercises to validate our choices in constructing the DIV-LMCI. These exercises not only give us confidence in our interpretation and application of our DIV-LMCI series but also provide a testing framework for other practitioners who may wish to make their own LMCI series. Additionally, the exercises highlight the similarities and differences between the national and divisional LMCIs, providing insight into similarities and differences in their labor markets.

Are two indicators enough?

First, we compare how well our indicators capture the information in our input variables across divisions to determine whether two indicators are enough to succinctly summarize the labor market in each division. When performing PCA, we must decide how many indicators (factors) to extract from the data. Selecting too many indicators defeats the purpose of summarizing the data in a concise manner, while selecting too few indicators risks missing valuable information. We extract two indicators for each set of division-level series because we want to be able to compare the DIV-LMCI with its national counterpart.

Chart 1 shows that our parsimonious choice of two indicators does help explain a large fraction of the variation in labor market data for any given division. The chart focuses on division-level data from 1992 to 2019 (excluding the unique circumstances surrounding the COVID-19 pandemic). A value of 100 means that the two extracted indicators explain all the variation in the corresponding division's labor market data, while a value of zero means the two indicators explain none of the

Chart 1: Variation of Data Explained by Each Indicator Across Divisions



Sources: Federal Reserve Bank of Kansas City and authors' calculations.

variation in the division's labor market data. For comparison, this chart also plots the corresponding amount of variation in the national data that the two national LMCI series explain (darker left-side bar).

The chart ranks the divisions from most to least variation explained and highlights some variation in the ability to succinctly explain labor markets across divisions. For example, the South Atlantic division (which includes Delaware, the District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia) ranks the highest, with about 71 percent of the variation in its labor market data explained by two indicators alone. In contrast, the West South Central division (which includes Oklahoma, Arkansas, Louisiana, and Texas) ranks the lowest, with 57 percent of the variation in its labor market data explained by two indicators alone.

Although the division-level LMCI series explain less variation than the U.S. series, this is somewhat to be expected. Much of the division-level data is a subset of the national data and so will inherently be more volatile and thus harder to explain. Despite the noisiness in the data and the variety of data sources and data series used, PCA still produces two indicators that pick up well over half of the variation, or information, in the 21 labor market series for each of the nine Census divisions.

Does the first indicator measure activity and the second momentum?

As a second exercise, we justify our interpretation of the division-level factors as division-level labor market conditions indicators for activity and momentum. Having quantified how *much* information the first two indicators in each division summarize, we can now provide a better description of the *type* of information they capture. To do so, we analyze their relationships with each of the 21 variables used as inputs to PCA.

PCA produces *factor loadings* that provide information on how input variables relate to the produced factors. The factor loadings can tell us how strongly related a given input variable is to a factor (indicator) as well as if they are positively or negatively related. For instance, in the national LMCI, the unemployment rate has a large negative factor loading for the level of activity, which tells us that the unemployment rate is strongly negatively related to the level of activity indicator. On the other hand, the unemployment rate's factor loading for momentum is nearly zero, meaning the unemployment rate is not particularly related to momentum.

As a first test, we compare which input variables have the largest factor loadings across divisions and find a lot of overlap with the national series. For each division and for the nation, Table 1 shows the three input variables with the largest factor loadings (in absolute value terms) for the first indicator produced by PCA when using input data from 1992 to 2019. These are the variables that are most strongly related to the division's first indicator. Each division's first indicator is usually strongly related to measures of inactivity or slack like the official unemployment rate (U-3), the broad unemployment rate (U-6), and the share of employed persons working part-time for economic reasons (PTER). Consistently, at the national level, the first indicator is also highly related to U-3 and U-6, with the PTER share coming in fourth (not shown in the table). Overall, as in Hakkio and Willis (2014), these findings provide justification for calling the first indicator of our division-level PCA the *divisional level of activity*.

Table 1: Input Variables Most Strongly Related to the First Indicator of the DIV-LMCI

Division	Variables
United States	Broad unemployment rate (U-6) Unemployment rate (U-3) Quits rate
New England	Broad unemployment rate (U-6) Unemployment rate (U-3) Working part time for economic reasons
Middle Atlantic	Broad unemployment rate (U-6) Unemployment rate (U-3) Working part time for economic reasons
East North Central	Broad unemployment rate (U-6) Unemployment rate (U-3) Quits rate
West North Central	Broad unemployment rate (U-6) Unemployment rate (U-3) Quits rate
South Atlantic	Broad unemployment rate (U-6) Unemployment rate (U-3) Working part time for economic reasons
East South Central	Unemployment rate (U-3) Broad unemployment rate (U-6) Consumer confidence, present situation
West South Central	Broad unemployment rate (U-6) Unemployment rate (U-3) Consumer confidence, present situation
Mountain	Broad unemployment rate (U-6) Unemployment rate (U-3) Working part time for economic reasons
Pacific	Broad unemployment rate (U-6) Working part time for economic reasons Unemployment rate (U-3)

Sources: Federal Reserve Bank of Kansas City and authors' calculations.

We perform the same exercise for the second indicator and find, across divisions, the second indicator is most related to variables that are forward-looking or capture rates of change, again consistent with the national level. Table 2 shows that for all divisions (and the United States), employment growth, hours growth, and temporary help employment growth are highly related to the second indicator. Hours and temporary-help employment growth capture margins of adjustment that firms may use before engaging in additional hiring or firing and can therefore be interpreted as precursors to future employment changes. Although not reported in the table, announced job cuts from Challenger-Gray-Christmas make the top four of many divisions' lists. This variable is also forward-looking, as it captures job separations that will occur in the future. Overall, because the variables in Table 2 reflect where the labor market is potentially headed rather than its current state, the second indicator can aptly be called *divisional momentum*.

Table 2: Input Variables Most Strongly Related to the Second Indicator of the DIV-LMCI

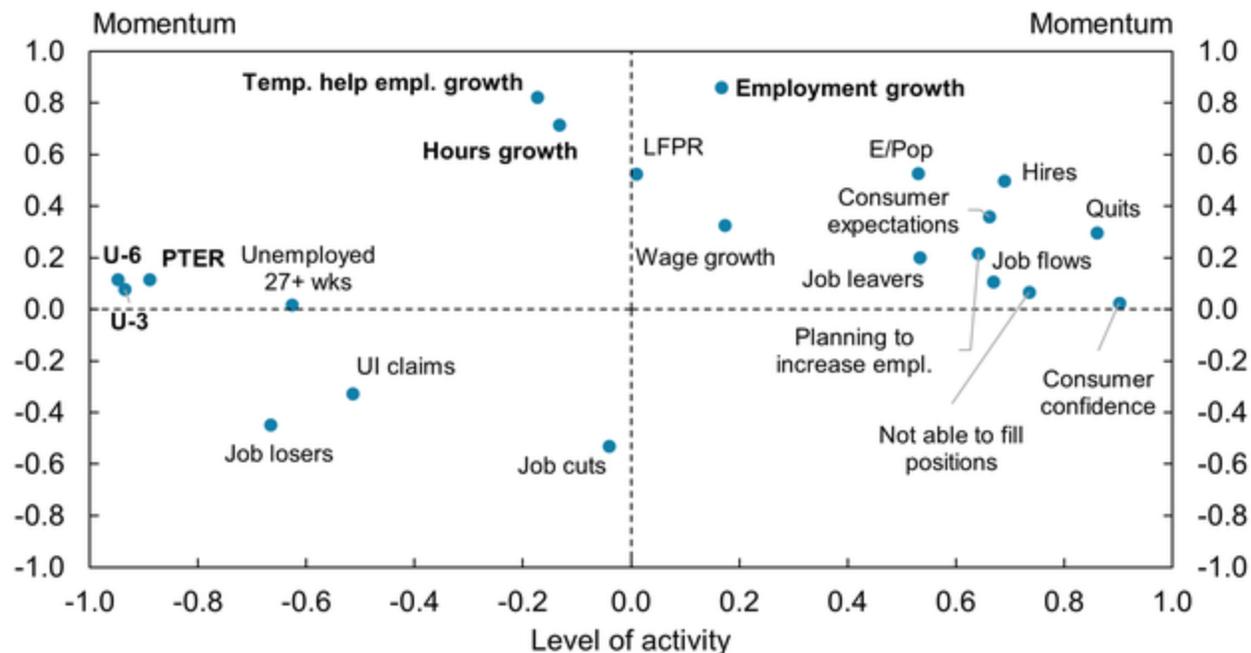
Division	Variables
United States	Private non farm payroll employment Aggregate weekly hours Temporary help employment
New England	Private non farm payroll employment Aggregate weekly hours Temporary help employment
Middle Atlantic	Private non farm payroll employment Aggregate weekly hours Temporary help employment
East North Central	Private non farm payroll employment Aggregate weekly hours Temporary help employment
West North Central	Private non farm payroll employment Temporary help employment Aggregate weekly hours
South Atlantic	Private non farm payroll employment Aggregate weekly hours Temporary help employment
East South Central	Private non farm payroll employment Aggregate weekly hours Temporary help employment
West South Central	Private non farm payroll employment Temporary help employment Aggregate weekly hours
Mountain	Private non farm payroll employment Aggregate weekly hours Temporary help employment
Pacific	Private non farm payroll employment Temporary help employment Aggregate weekly hours

Sources: Federal Reserve Bank of Kansas City and authors' calculations.

Although we can rank variables based on how strongly they are related to one indicator, many variables are related to both. *Loading plots* help us understand these relationships by providing a graphical representation of how some variables are more related to (or *load* on) one indicator versus another. Specifically, a loading plot plots each input variable's factor loading for the first indicator produced by PCA versus its factor loading for the second indicator. Each input variable is represented by a dot, with the position of each dot reflecting how that variable is related to the two indicators.

Chart 2 displays the loading plot of the West South Central division and reveals how measures of activity or inactivity (such as the unemployment rate) are more related to the level of activity indicator, whereas rate of change variables (such as employment growth) are more related to momentum. Consistent with the results in Table 1, we see that U-3, U-6, and the PTER share are all clustered at the middle left of this figure, highlighting that they are strongly negatively related to the level of activity (measured on the horizontal axis) but not closely related to momentum (measured on the vertical axis). Meanwhile, consistent with the results in Table 2, employment and hours growth are clustered at the top center of this figure, highlighting that they are strongly positively related to momentum but not closely related to activity.

Chart 2: West South Central Division's Loading Plot

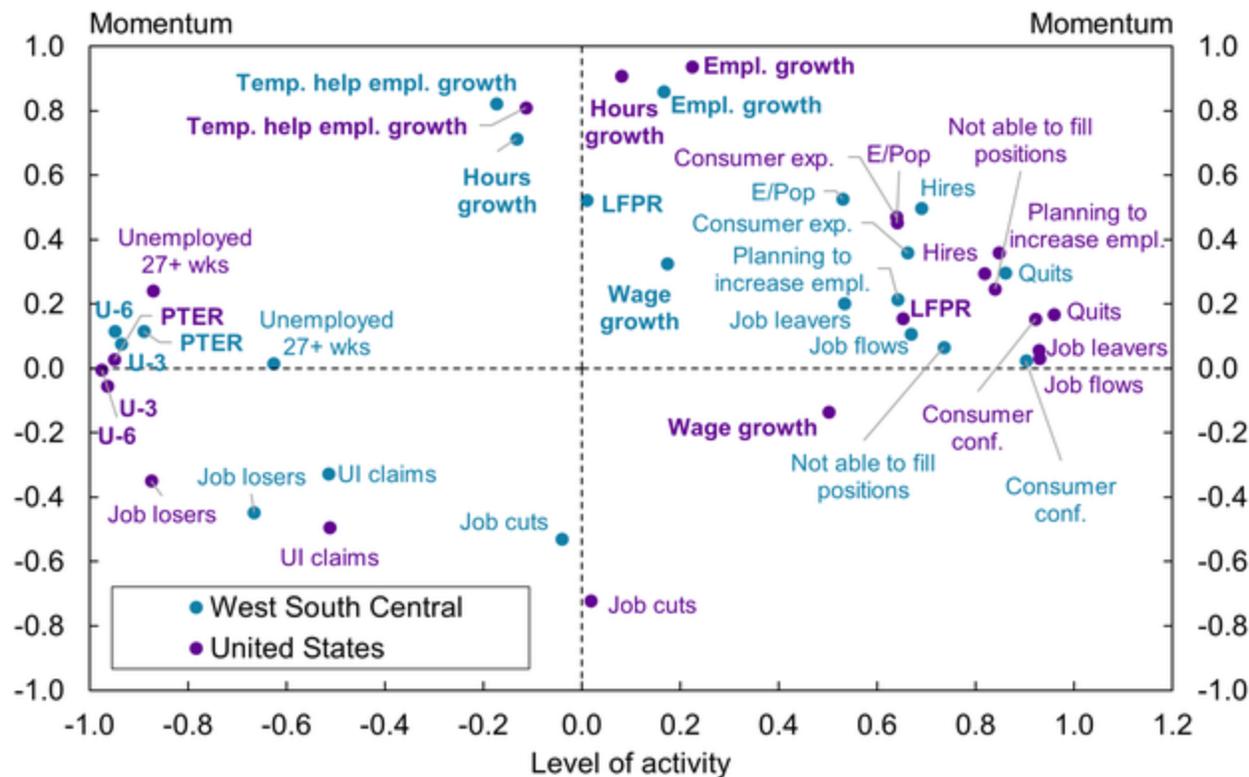


Notes: We abbreviate the variables included in the chart as follows: the official unemployment rate (U-3), the broad unemployment rate (U-6), the share of people reporting working part-time for economic reasons (PTER), the labor force participation rate (LFPR), and the employment to population ratio (E/Pop). For more information on the data series used in our analysis, please see our data appendix.

Sources: Federal Reserve Bank of Kansas City and authors' calculations.

Loading plots can also give us a sense of the similarity of indicators between divisions or between a division and the United States as a whole. Chart 3 plots the factor loadings for the West South Central division and the United States on a single chart and shows that the West South Central division's loading plot is fairly similar to that of the United States. Returning to the examples highlighted in Chart 2, both the West South Central division (blue dots) and the United States (purple dots) display the same cluster of inactivity measures (U-3, U-6, and PTER) in roughly the same middle-left location. Similarly, both divisions display the same cluster of rate-of-change measures (employment and hours growth) in the same top-center location. More generally, almost all input variables are positioned similarly on the West South Central and U.S. plots. From a statistical standpoint, the West South Central LMCI are most dissimilar to the U.S. LMCI out of all divisions.^[5] Therefore, we can assume only minor differences in factor loadings between the DIV-LMCI and the national LMCI across divisions.

Chart 3: West South Central Versus U.S. Loading Plot



Notes: We abbreviate the variables included in the chart as follows: the official unemployment rate (U-3), the broad unemployment rate (U-6), the share of people reporting working part-time for economic reasons (PTER), the labor force participation rate (LFPR), and the employment to population ratio (E/Pop). For more information on the data series used in our analysis, please see our data appendix.

Sources: Federal Reserve Bank of Kansas City and authors' calculations.

Despite the overall similarity between the West South Central and U.S. LMCI, Chart 3 also depicts a few notable exceptions. For example, in the West South Central division, the labor force participation rate is unrelated to activity but strongly positively related to momentum (the corresponding blue dot is in the top center of the plot). In contrast, for the United States, participation is strongly positively related to activity but unrelated to momentum (the corresponding purple dot is located on the right side of the plot near the horizontal zero line). Another example is wage growth, as measured by the three-month percent change in average hourly earnings. In the West South Central division, wage growth is positively related to both activity and momentum. Meanwhile, in the nation, wage growth is positively related to activity but negatively related to momentum.

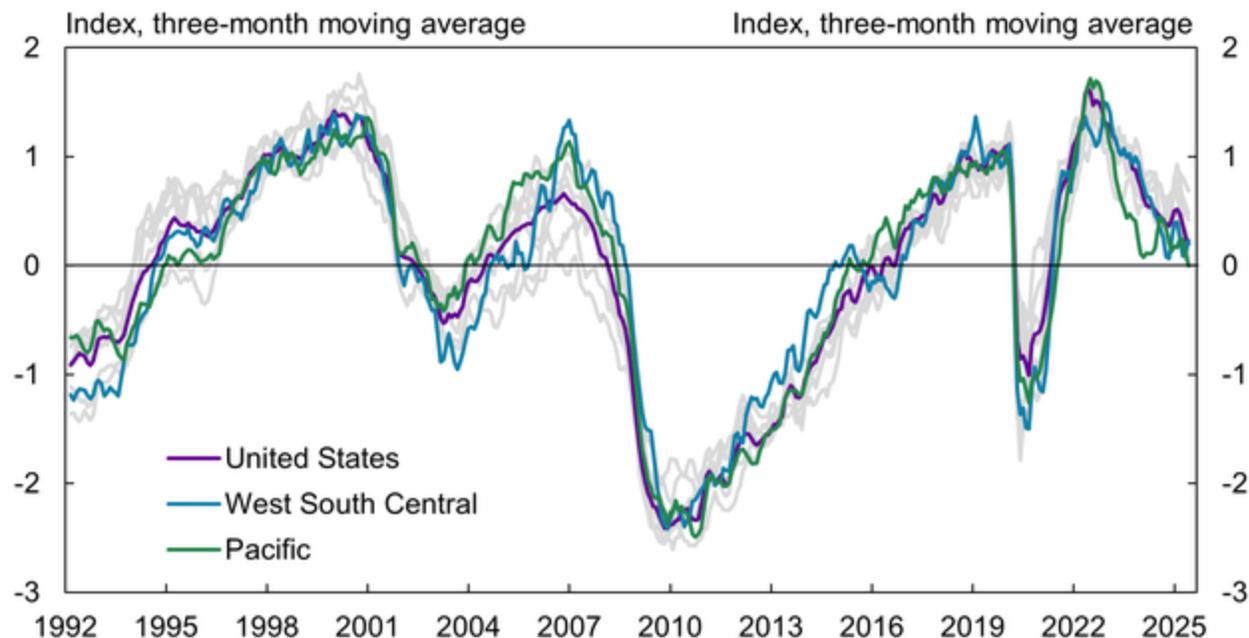
These differences highlight the importance of testing rather than assuming that our indicators will have the same interpretations as the U.S. LMCI. Input variables can tell us different things about the labor market health or trajectory of different geographic or demographic groups. For the United States, higher wage growth normally appears when the labor market is particularly tight during the maturation phase of economic expansions and so is positively related to the level of activity. However, wage growth is predictive of low or negative growth in the labor market as it appears when labor markets have little room to grow. Consequently, wage growth is negatively related to momentum. By contrast, for a smaller geographic region (such as a division), higher wage growth might bring in workers from other areas of the country and fuel growth in the labor market, resulting in the positive relationship seen between wage growth and momentum in the West South Central division.

Thus, loading plot charts for the West South Central division highlight the value of divisional LMCIs. If a policymaker only compared wage growth in the West South Central division with wage growth in the United States, they would conclude that labor market conditions are not that similar between this division and the nation. Indeed, the historical correlation between wage growth in the West South Central division and the United States is only around 0.5. However, as Chart 3 reveals, looking at a wide array of labor market measures suggests the West South Central division's labor market is more like the nation's than wage growth alone suggests.

III. The DIV-LMCI Over Time

In addition to providing information on general differences and similarities across labor markets, the DIV-LMCI also allow us to compare labor market conditions across divisions over time. Chart 4 shows that across divisions, the level of activity series co-move over the business cycle, with similar peaks and troughs as the national level of activity. Because each indicator is normalized to have an average of zero and standard deviation of one, we cannot directly compare the magnitude of one series to another. However, we can make relative statements. For example, the magnitude of the blue line's 2007 peak suggests the level of activity in the West South Central division recovered back to its pre-2001-recession level. Loosely speaking, the labor market in this division was likely as tight in 2007 as it was in 2000. By contrast, we see the opposite for the nation. Indeed, in 2007, the purple line for the United States falls short of its pre-2001 recession peak.

Chart 4: The Divisional and National Level of Activity Indicators Over Time



Notes: The West South Central division includes Oklahoma, Arkansas, Louisiana, and Texas. The Pacific division includes Washington, Oregon, California, Alaska, and Hawaii. All other divisions are plotted in gray.
Sources: Federal Reserve Bank of Kansas City and authors' calculations.

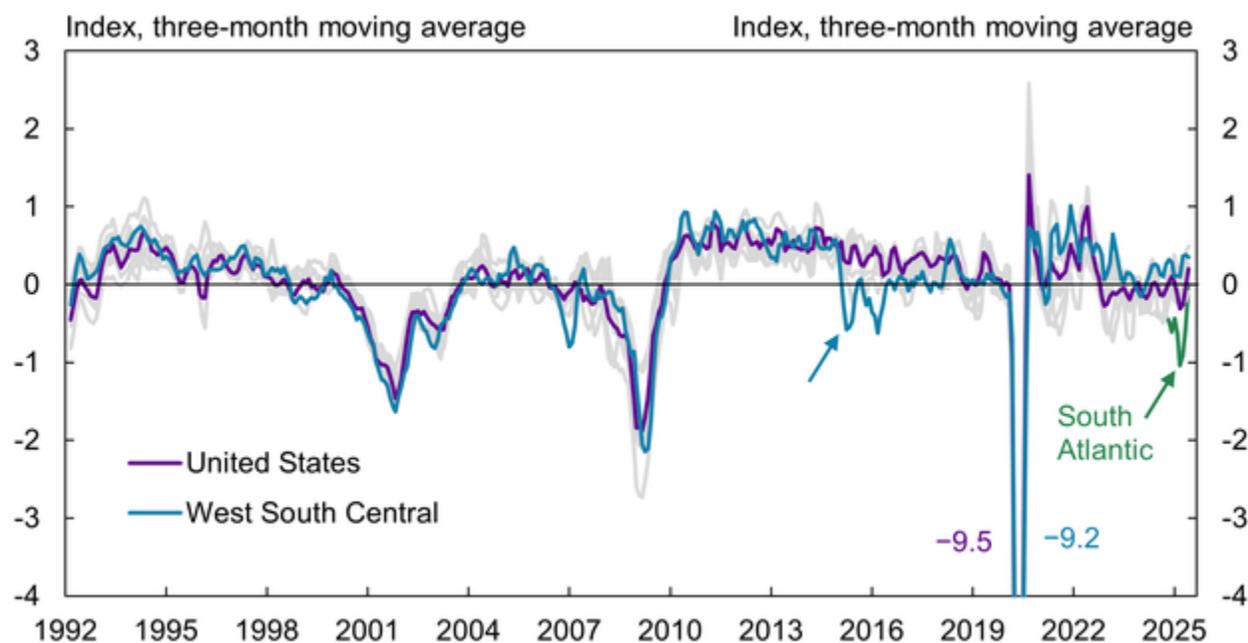
This divergence again highlights the importance of observing a variety of labor market indicators. The unemployment rate, a standard gauge of labor market health, behaved very similarly between the West South Central division and the nation from 2001 to 2007. However, other series behaved differently. For example, during the recovery from the 2007 recession, the quits rate—which in Chart 3 is strongly and positively correlated with the level of activity for both the West South Central division and the nation—returned to pre-recessionary levels in the West South Central division but fell short of that level for the United States.

Chart 4 shows that, more recently, the sharp labor market contraction and recovery from the COVID-19 pandemic was similar across geographies, though with some variation. All series saw a sharp fall during early 2020, when lockdowns were implemented, followed by a rapid recovery as COVID-19 mitigation policies eased. However, the size of the recovery varied across geographies. The level of activity indicator in the West South Central division essentially recovered to pre-pandemic levels. By contrast, the nation's recovery was unprecedented, with the level of activity reaching levels never seen in any of the prior recoveries.

The Pacific division (green line in Chart 4) also had a strong recovery following the COVID-19 pandemic, but its strength was shorter-lived, deviating from other divisions and the nation. After reaching unprecedented levels during the recovery from the COVID-19 pandemic, the Pacific division’s level of activity indicator fell precipitously, almost returning to its longer-run average by the start of 2024. This decline coincides with the spike in layoffs faced by the Pacific Coast-concentrated tech sector during 2022 and 2023.^[6] Again, this example highlights the ability of the DIV-LMCI to capture division-level shocks that are not visible in the U.S.-level series.

In Chart 5, we also see strong business cycle co-movement across divisions and the nation in the momentum indicators, with some notable divergences. For example, the West South Central division experienced noticeably lower momentum during the 2014–16 period than other divisions or the nation, falling below its longer-run average (blue line). This period of low momentum coincides with a crash in commodities prices. Oil, for example, declined from roughly \$100 a barrel in mid-2014 to below \$40 a barrel in early 2016. Several states in the division (Texas, Oklahoma, and Louisiana) are heavy commodity producers, so the division’s labor market may have been disproportionately affected by the crash.

Chart 5: The Divisional and National Momentum Indicators Over Time



Notes: The West South Central division includes Oklahoma, Arkansas, Louisiana, and Texas. The South Atlantic division includes Delaware, the District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia. All other divisions are plotted in gray.

Sources: Federal Reserve Bank of Kansas City and authors’ calculations.

More recently, momentum in the South Atlantic division (green line) fell well below its longer-run average during the first half of 2025, while other series stayed closer to their longer-run averages. This decline coincided with the announcement of federal government layoffs concentrated in Washington D.C., a member of the South Atlantic division. As announced layoffs returned to more normal levels in subsequent months, the momentum indicator returned to its longer-run average, and the level of activity for the division remains in line with other geographies. These two examples again highlight the value of looking at more geographically disaggregated labor market conditions.

Conclusion

In this article, we introduce a new tool for analyzing labor market conditions in the United States in a more granular way: the DIV-LMCI. We find that much like at the national level, labor market conditions at the Census division level can be characterized by two measures: the divisional level of activity and divisional momentum. The level of activity indicator captures information on labor market activity in a geography and is closely related to measures of labor market slack or inactivity such as the unemployment rate. Meanwhile, the momentum indicator captures information on labor market trajectory and is associated with measures of rates of change such as employment growth.

Our analysis suggests that these two indicators exhibit co-movement over business cycles across divisions, showing similar peaks and troughs as the nation as a whole, though with some differences. The co-movement of the DIV-LMCI highlights that divisional labor markets are more similar than what might be inferred by looking at only a single labor market measure (such as the unemployment rate). By contrast, the cross-division differences captured by the DIV-LMCI reveal that these indicators can also pick up on division-specific labor market shocks such as the commodity crash in the West South Central division, which got obscured at the national level.

Beyond characterizing labor market conditions across Census divisions, this article provides a basic framework that can be used to construct and analyze labor market indicators at other levels of aggregation. Data constraints notwithstanding, our framework can be replicated for other geographic delineations, such as at the state level. Our framework can also be used to analyze labor market conditions by demographic characteristics such as age, education, race, ethnicity, or gender.

Although beyond the scope of this article, the DIV-LMCI can be used to create broad measures of divisional unemployment following Glover, Mustre-del-Río, and Pollard (2021), or to generate cleaner measures of divisional payrolls as in Lusompa and Mustre-del-Río (2025).

Endnotes

- [1] For example, Dilts Stedman and Pollard (2023) construct industry-level LMCI using industry-specific labor market measures.
- [2] For more information on the input variables used in the divisional and national LMCI, please see our data appendix.
- [3] Following Hakkio and Willis (2014), we normalize the input variables (take the z-score) before running PCA, and we rotate our factors using the varimax method after running PCA.
- [4] The national-level LMCI presented throughout the rest of the paper is slightly different than the Kansas City Fed LMCI as it uses fewer input data series (21 instead of 24). This ensures comparability between the national and division-level LMCIs. However, we verified that the national-level LMCI presented here is quite similar to the officially published Kansas City Fed LMCI, suggesting this consistency requirement is not critical.
- [5] We measure similarity by calculating the Procrustes statistic obtained by transforming the West South Central division's LMCI to best match the U.S. LMCI. The Procrustes statistic between the West South Central and U.S. LMCIs ranks highest (most dissimilar) at 0.11. Meanwhile, the Procrustes statistic between the South Atlantic and U.S. LMCIs ranks lowest (most similar) at 0.04. Procrustes analysis is a standard method of multidimensional scaling to help transform one set of data (or, in our case, indicators) to another. For more details, see Gower and Dijksterhuis (2004).
- [6] Using their industry-level LMCI series, Dilts Stedman and Pollard (2025) find a similar decline in the level of activity for the information industry, which includes the tech sector.

Article Citations

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