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Working Papers

Research Department

WORKING PAPER NO. 99-19

USING STATE INDEXES TO DEFINE ECONOMIC REGIONS IN THE U.S.

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I wish to thank Tim Trautmann for providing extensive research assistance for this paper. For many helpful comments I thank the participants in the Workshop on Regional Economic Indicator Models, Braga, Portugal, June 1998. The views expressed in this paper are those of the author and do not necessarily reflect those of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

Abstract

When regional economists study the interaction of multi-state regions in the U.S., they typically use the regional divisions developed by the U.S. Bureau of the Census or the Bureau of Economic Analysis (BEA). The current census divisions were adopted in 1910 and divide the states into nine regional groups for the presentation of data. Since the 1950s the BEA has grouped the states into eight regions based primarily on cross-sectional similarities in their socioeconomic characteristics. The BEA definition of regions is perhaps the most frequently used grouping of states for economic analysis.

Since many economic studies of regions concentrate on similarities and differences in regional business cycles, it seems appropriate to group states into regions based on some common cyclical behavior. This paper explores the possibility of grouping states into regions based on common movements in state indexes of economic activity. These state indexes are variants of the coincident index developed by James Stock and Mark Watson for the U.S. economy.

We have applied cluster analysis to the monthly changes in these economic activity indexes to group the states into regions with similar business cycles. We have identified six distinct regions consisting of contiguous states with similar monthly changes in their economic activity indexes.

Introduction

Regional analysis in the United States can be done on several levels of aggregation. Counties are the smallest geographic unit for which adequate data are generally available. For the most part, however, county data are available only on an annual basis. And annual data do not allow us to track the cyclical behavior of the economy because recessions can begin and end within a calendar year. Moreover, it is doubtful that counties are large enough geographic units and independent enough to be used for business cycle analysis. A large percentage of counties have enough residents and job-holders commuting across county lines that they are considered part of a wider local economy. Metropolitan areas represent a county or group of counties with a sufficient concentration of employment and population and enough cross-county commuting to function as a single local economy. Monthly data such as employment and unemployment rates are available for metropolitan areas, but these areas do not encompass the entire U.S. More than 20 percent of the nation's population and about 15 percent of its jobs are outside metropolitan areas. States are the smallest geographic units in the U.S. that include the entire country and for which sufficient monthly data exist to trace the cyclical behavior of the economy.[1] Statisticians and other researchers have tended to group states together into larger regions for economic and social analysis. The two most popular groupings are the U.S. Census regions and divisions and the economic regions designated by the Bureau of Economic Analysis (BEA). Economists have tended to use one of these two groupings to examine various regional trends and cycles.[2] These economic studies have generally assumed that the regions are properly defined and have proceeded to analyze the differences in trends and cycles.

The purpose of this paper is to take a step back and ask which states should be combined

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[1]See Crone (1994). A state, of course, may include several metropolitan areas or parts of metropolitan areas. Thus, using state data for our analysis will involve combining some cohesive economies and dividing others, but there is no alternative to using state data if we wish to include the entire economies of the contiguous 48 states.

[2]See Kim (1995 and 1998) for the use of the census divisions; see Toal (1977); Mills (1991); Carlino and DeFina (1995 and 1996); Carlino and Mills (1993 and 1996); and Carlino and Sill (1997) for the use of the BEA regions.

into regions for economic analysis and which criteria should be used. Section I describes the criteria for the regional division of the Bureau of the Census and the Bureau of Economic Analysis. We argue that for time-series analysis the appropriate regional division of states should be based on the historical similarity of the cyclical movements in the states' economies. Section II describes the construction of state economic activity indexes that are used as the measure by which states are grouped into regions. Section III describes the results of a cluster analysis of the contiguous 48 states based on the monthly change in these state economic activity indexes. The regions resulting from the cluster analysis are compared with the BEA regions. Section IV compares the results of the cluster analysis based on the states' economic activity indexes with cluster analyses based on the components of the indexes. Section V outlines future steps in this research effort.

I. Criteria for the Definitions of Regions

Since 1850 the Bureau of the Census has divided the states into regions for the presentation of data. Currently, the bureau groups the states into four regions, and the regions are further divided into nine divisions. Except for the addition of Alaska and Hawaii to the Pacific division in the 1950s, the composition of the nine divisions has remained unchanged since 1910. (See Table 1, Census Regions and Divisions.) Economists who use the census breakdowns tend to use the nine divisions rather than the four regions. After the 1950 census, an interagency committee within the Department of Commerce reviewed the definition of census regions and divisions in an effort to group the states according to the following principles:[3]

1. Socioeconomic homogeneity should be the main criterion for grouping states.
2. Each group should consist of two or more adjacent states.
3. Objective statistical analysis should be the primary basis for the grouping of states.
4. The number of eventual groups should range between 6 and 12.

This review resulted in several suggestions for the reclassification of states, but the proposed changes were never adopted by the Census Bureau because of the lack of acceptance by the data users.

[3]See Bureau of the Census (1994), chapter 6, pp. 18-19.

With one modification, however, the BEA adopted one of the committee's proposed groupings of the states as its definition of multi-state regions.[4] This grouping defines the eight BEA regions and has not been adjusted since its introduction in the 1950s. (See Table 2 and Figure 1, BEA Regions.)

The economic variables used by the interagency committee of the Commerce Department to define socioeconomic homogeneity included (1) the sources of income by economic sector in 1950, (2) the level of per capita income in 1950, (3) the trend in per capita income between 1929 and 1950, and (4) the industrial distribution of workers in 1950. Except for the trend in per capita income, all these variables describe the state's economic profile at a point in time. In contrast, this paper uses the common pattern in the states' economies over time as the criterion for grouping them into regions. This focus corresponds to much of the recent regional research on the cyclical behavior of regions.[5] We adopted the criteria set forth in the 1950s by the Department of Commerce interagency committee that a region must consist of two or more adjacent states and that the number of groupings range between six and 12. And we chose cluster analysis as the statistical basis for grouping the states. Finally, we used a Stock-Watson type composite economic activity index as the variable on which to perform the cluster analysis.

II. Construction of State Economic Activity Indexes

Composite indexes are not new. In the late 1940s the Department of Commerce began publishing three such indexes for the national economy—the composite indexes of leading, lagging, and coincident indicators. In 1994, the Conference Board took over the production of these indexes. Of the three indexes, the composite index of coincident indicators is the most important for tracking the business cycle. This index is constructed from four monthly data series—the number of jobs in nonagricultural establishments, personal income (minus transfer payments) adjusted for inflation, the index of industrial production, and manufacturing and trade sales adjusted for inflation. While the composite index of coincident indicators has tracked

[4]The modification was the combining of an Upper South and a Lower South region into one Southeast region.

[5]See Toal (1977) Carlino and DeFina (1996); and Carlino and Sill (1997).

national business cycles fairly accurately, it has been criticized for not being derived from a formal mathematical or statistical model.

To support the theory of business cycles and aid in the dating of recessions and expansions, James Stock and Mark Watson constructed an alternative index of coincident indicators in the late 1980s.[6] Using time-series techniques for estimating latent variables, they formalized the notion that the business cycle is best measured by the common movements across several economic data series. Each monthly indicator is thought of as having two components. The first is the general "state of the economy," which affects all the indicators. It is not observed directly but only in the common movement of the indicators that are observed. The second component is an idiosyncratic element that might cause any one indicator to move in ways not associated with the general state of the economy. Stock and Watson's coincident index is an estimate of the common component. The movement of this unobserved state of the economy is reflected in varying degrees in each of the published monthly series used to estimate the composite index. Moreover, for some series, changes in the general economy could be reflected not only in the current month but also in succeeding months, and for other series, changes in the general economy could be foreshadowed in preceding months. In effect, the Stock and Watson index is a weighted average of current and past values of the individual indicators, with the weights determined by the degree of common movement in the indicators.

The basic notion that a change in a monthly indicator reflects a change in the underlying state of the economy is captured in the following equation:

$$\Delta I_t = a + b\,\Delta S_t + u_t \qquad (1)$$

where:

ΔI_t = the change in the observed monthly indicator between time t-1 and time t, and

ΔS_t = the change in the unobserved state of the economy between time t-1 and time t.

Since the purpose of this model is to form a composite index, this equation is applied to a number of monthly indicators. For example, Stock and Watson use four monthly indicators to construct their alternative composite index, so there are four equations similar to equation (1) in their model. The coefficients (a and b) will vary with each equation, but the unobserved variable

[6]Stock and Watson (1989).

(ΔS_t) is the same. In addition, the error term in equation (1) and the unobserved variable are assumed to follow an autoregressive process, so that

$$u_t = g_1 u_{t-1} + g_2 u_{t-2} + e_t \quad (2)$$

and

$$\Delta S_t = c + f_1 \Delta S_{t-1} + f_2 \Delta S_{t-2} + z_t \quad (3)$$

where e_t and z_t are error terms. Equations (2) and (3) are the transition equations in the system.

This system of equations (1) through (3) can be estimated using maximum likelihood techniques to produce an estimate of the change in the unobserved state of the economy (ΔS_t). If we then index the unobserved variable S_t to equal 100 at some point in time, we can construct a time-series of the so-called "state of the economy," or a coincident index.

In constructing their coincident index, Stock and Watson use the same data series as the Conference Board with one exception: they substitute employee hours in nonagricultural establishments for the number of nonagricultural jobs because economic output depends not only on how many people are working but also on how long they work. Stock and Watson's new index is available from 1959, and since that time, it has coincided with the official business cycles even more closely than has the Conference Board's Index of Coincident Indicators. The cyclical highs and lows in the Stock and Watson index coincide exactly with the official business-cycle turning points except in 1969, when the new index peaks two months prior to the official turning point.

The success of the Stock and Watson method in constructing a national coincident index that tracks the official business cycles so closely suggests that this method could be used successfully to construct an index for state economies. But the construction of a comparable state index is not a simple matter of estimating Stock and Watson's model using state data. The monthly indicators used by Stock and Watson are not available at the state level. Moreover, there is no direct way to determine whether a composite index using other indicators at the state level would coincide with the state's business cycle because there are no official dates for state business cycles. To address the problem of finding an appropriate set of indicators to construct state indexes, we identified a set of monthly indicators that are available at both the national and state levels. We selected those variables that were useful in dating national business cycles and

assumed they would also be useful in identifying cycles in the state economies.[7]

Crone (1994) identified four variables that produced a reliable national index and could be used in our state indexes of monthly indicators—the total number of jobs in nonagricultural establishments, real retail sales, average weekly hours in manufacturing, and the unemployment rate. In 1997, however, the Department of Commerce ceased publication of monthly retail sales data for the states. Therefore, our state indexes are now based only on three data series. For this paper we estimated monthly economic activity indexes for the 48 contiguous states using a three-variable model. Because all the series were not available for the 48 contiguous states prior to 1978, our composite index is estimated from 1978 through March 1997. The measurement equations in the system for each state are:

$$\Delta emp_t = b_e \, \Delta S_t + u_{te} \qquad (4)$$

$$\Delta hrs_t = b_h \, \Delta S_t + u_{th} \qquad (5)$$

$$\Delta UR_t = b_{u0} \, \Delta S_t + b_{u1} \, \Delta S_{t-1} + b_{u2} \, \Delta S_{t-2} + b_{u3} \, \Delta S_{t-3} + u_{tu} \qquad (6)$$

where

Δemp = the standardized change in the log of nonfarm employment

Δhrs = the standardized change in the log of average hours worked in manufacturing

ΔUR = the standardized change in the unemployment rate.

Lagged values of the unobserved state of the economy are entered in the equation for the unemployment rate because including the lags produced a national index that coincided better with the official recession dates. Moreover, the unemployment rate is often a lagging indicator, reflecting the state of the economy in previous months.

III. Cluster Analysis Using State Indexes

To group the 48 contiguous states into regions based on the cyclical behavior of their economies, we applied cluster analysis to the monthly log difference of our Stock-Watson type indexes.[8] The clustering was done using the VARCLUS procedure in SAS. Because we adopted

[7]See Crone (1994).

[8]For an earlier use of cluster analysis in regional economics see Carlino and Lang (1989).

the criteria of the interagency committee that called for six to 12 regions, we stipulated that the program produce at least six clusters. The results of the clustering are shown in the map in Figure 2. Only three states—Rhode Island, Delaware, and Montana—did not belong to the same cluster as *one* of their neighboring states. We refer to them as isolated states. Arizona and Utah were in the same cluster, but we did not consider them a two-state region because together they contain less than 2.5 percent of the nation's nonfarm employment—an admittedly arbitrary criterion. The changes in their monthly economic activity indexes were similar to those of some New England states and Montana. Our cluster analysis divided the remaining 43 contiguous states into six regions. None coincides exactly with any of the BEA regions, but each contains several states that are grouped together by the BEA. Each of our six regions contains between three and 13 contiguous states. The cluster analysis suggests that the cyclical behavior of each region as measured by the changes in the states' economic activity indexes is distinct from the cyclical behavior of the other five regions. By analogy to the BEA designations, we have labeled the six regions: New England, the Mideast, the Great Lakes, the Southeast, the Southwest/Plains, and the Far West. (See Table 3.)

The strength of a state's attachment to its own cluster or, in this case, its own region can be measured by the squared correlation of the log difference of the state's economic activity index with its own cluster component (Table 3, column 3). This correlation with its own cluster component can be compared to the next highest squared correlation for all the other cluster components (Table 3, column 4). If the value of the squared correlation with its own cluster component is high and the value of the next highest squared correlation with the other cluster components is low, the state is strongly attached to its own region and well separated from the others.

Since the BEA regions were in part defined by economic criteria, we will use them as the main grouping of states to be compared with the results of our own cluster analysis. Only three of the BEA's six New England states are included in our New England region—Maine, New Hampshire, and Massachusetts. The cluster analysis suggests that the economies of three other states (Arizona, Utah, and Montana) follow a pattern similar to this New England cluster's economy. Montana's similarity to the New England region is weak, however (squared correlation

= 0.13). Arizona and Utah, on the other hand, are at least as strongly attached to the cluster as New Hampshire and Massachusetts, but since they are not contiguous to the New England states, they are not included in the region.

Our analysis identified a cluster of seven states that form what we call the Mideast region: Pennsylvania, New Jersey, New York, Connecticut, Maryland, West Virginia, and Vermont. This region is somewhat larger than the BEA's Mideast region, which does not include Connecticut, West Virginia, and Vermont. And Vermont is only loosely attached to our Mideast region (squared correlation = 0.19). The BEA's Mideast region also includes Delaware, which in our cluster analysis is an isolated state statistically associated with the Great Lakes region.

The Great Lakes region that results from our cluster analysis includes all the states in the BEA's Great Lakes region except Wisconsin. In addition, our Great Lakes region includes Iowa, which the BEA classifies among the Plains states. When we applied cluster analysis to the components of our state economic activity indexes (see below), the states around the Great Lakes were most consistently grouped in the same region.

The region that we identified as the Southeast from our cluster analysis contains all the states from the BEA's Southeast region except West Virginia and Louisiana. West Virginia is part of our Mideast region, and Louisiana part of the Southwest/Plains. Our Southeast region also contains two states not in the BEA's Southeast region—Missouri and Oklahoma. Based on the squared correlation with the cluster component, however, these two states had as strong an attachment to the Southeast region as some of the traditional Southeast states like North and South Carolina.[9]

The fifth region identified by our cluster analysis is labeled the Southwest/Plains. It contains seven of the 11 states contained in the BEA's Southwest and Plains regions. Based on the squared correlation with their own cluster component, these states form the least cohesive of the regions identified by our analysis. Four states in the BEA's Southwest and Plains regions are not included in this region (Iowa, Missouri, Oklahoma, and Arizona), and three states in our Southwest/Plains region are not included in either of the BEA regions (Colorado, Wisconsin, and

[9]According to the results of our cluster analysis, Rhode Island's economy follows a pattern similar to that of the Southeast region.

Wyoming).

The Far West region identified by our cluster analysis contains all the contiguous states in the BEA's Far West region (Oregon, Washington, Nevada, and California).[10] Our Far West region also contains Idaho, which is one of the Rocky Mountain states in the BEA classification. The cluster analysis did not identify any group of states that resembled the Rocky Mountain region as defined by the BEA.

How can we summarize the comparison of the BEA regions with the regions that result from our cluster analysis on the states' economic activity indexes? If we combine the BEA Southwest and Plains regions so that the regions defined by our cluster analysis approximate the BEA regions, 32 states are in the same region under either classification. Eleven states shift from their BEA region to an adjoining region, and five states are not included in any region based on our cluster analysis. Thus, grouping the states based on a cross-sectional comparison of their economic profiles or a time-series comparison of their economic performance results in a great deal of similarity in the groupings. But some economically important states fall into different regions, such as Wisconsin, Missouri, Louisiana, Connecticut, Iowa, and Oklahoma. Each of these represent between 6 and 28 percent of the employment in their respective BEA region. Missouri and Iowa together contain more than 40 percent of the employment in the BEA's Plains region. It would be informative to know if the change in regional definitions suggested by this cluster analysis would significantly alter the results of recent research on the cyclical behavior of regions.

IV. Comparison of Cluster Analysis on State Economic Activity Indexes with Cluster Analysis on the Components of the Indexes

We chose to base our new definition of regions on the clustering of states using a Stock-Watson type composite index because it represents a more comprehensive measure of a state's economy than the individual components of the index. To see what difference using the

[10]The BEA's Far West region also includes Alaska and Hawaii. We did not include Alaska and Hawaii in our analysis because we judged their economies to be significantly different from their nearest neighbors in the 48 contiguous states.

composite index makes, we compared the clusters based on the index with clusters based on the components of that index (nonfarm employment, the unemployment rate, and the average hours worked in manufacturing). For nonfarm employment and the average hours worked in manufacturing, the clustering was based on the monthly log difference. For the unemployment rate, it was based on first differences.

The results of the cluster analysis based on nonfarm employment are shown in the map in Figure 3. This clustering produces nine regions of two or more contiguous states, although two of the nine regions contain only two states each—the California-Arizona combination and the Arkansas-Mississippi combination. Moreover, Arkansas and Mississippi together account for less than 2 percent of total U.S. nonfarm employment.

If we apply the same criteria we used in the last section and do not consider the Arkansas-Mississippi combination a region, the clustering based on nonfarm employment results in eight regions of two or more contiguous states. There are also two isolated states--Delaware and North Dakota. All the New England states plus New York and New Jersey form a large region in the Northeast. Forming a separate region with a similar pattern of monthly changes in nonfarm employment are the South-Atlantic states from North Carolina to Florida. The California-Arizona region follows the same pattern. The clustering by nonfarm employment produces a region that includes a series of states along the Appalachian range from Pennsylvania to Tennessee with the addition of Alabama. Two of these states (Pennsylvania and Maryland) are in the BEA's Mideast region, and the rest are in the Southeast. The five states in the BEA's Great Lakes region remain in the same region when we cluster by nonfarm employment. Besides these five states, the new Great Lakes region also includes Missouri. Four of the seven states in the BEA's Plains region cluster together with Montana to form a distinct region. Clustering by nonfarm employment produces a large South Central region that stretches from Louisiana to Wyoming and includes states from four BEA regions.

Finally, this clustering produces a Northwest region that includes Washington, Oregon, Idaho, Nevada, and Utah. The regions based on changes in nonfarm employment differ substantially from both the BEA regions and the regions based on changes in the state economic activity indexes. There are no regions comparable to the BEA's Rocky Mountain or Mideast

regions, and the Southeast region is significantly altered.

The second component of the state economic activity indexes is the unemployment rate. Clustering by first difference in the monthly unemployment rate results in eight or nine regions of contiguous states, depending on whether one considers California a single-state region.[11] However, clustering by the unemployment rate results in eight isolated states that do not fall into the same cluster as any of their neighbors, as shown in the map in Figure 4. Clustering by the unemployment rate produces regions in which all the BEA's New England states remain in the same region. This is also true of all states in the BEA's Southwest region. Three of the BEA's five Great Lakes states also remain in the same region. The other BEA regions, however, are not recognizable in this clustering.

The third component in the state economic activity indexes is the average hours worked in manufacturing. Clustering on the log difference of average hours worked produces seven regions of three or more states, as shown in the map in Figure 5. All the states in the BEA's Mideast region cluster in the same region when we use average hours worked in manufacturing. Most of the states in the BEA's New England, Great Lakes, and Southeast regions also cluster together in similar regions. This clustering, however, results in seven isolated states that do not belong to the same cluster as any of their neighboring states.

V. Conclusions

In the 1950s an interagency committee in the Department of Commerce set out to group the states into regions based on the cross-sectional similarity of their socioeconomic characteristics. This paper has set out to group states into regions according to the similarity of their economic performance over time. To define our regions, we applied cluster analysis to monthly changes in a Stock-Watson type economic activity index constructed from nonfarm employment, the unemployment rate, and the average hours worked in manufacturing. Thirty-two of the 48 contiguous states clustered into regions similar to those defined by the BEA. Three states remained isolated, with no neighboring state falling into the same cluster. And two states

[11]The rationale for considering California a single-state region is that it contains more than 10 percent of the nonfarm employment in the U.S.

clustered together in a combination that we thought too small to be considered a region. When we clustered the states using the components of the economic activity indexes separately, the resulting regions differed markedly from those based on the clustering by the state economic activity indexes and from the BEA regions. The number of isolated states without a neighboring state in the same cluster ranged from two to eight.

This clustering exercise has provided an alternative to the BEA's definition of regions. However, a number of questions remain before the method can be used to define new commonly accepted economic regions based on the cyclical behavior of the states' economies.

First, which variable or variables should we use to cluster the states into regions? Clustering based on the Stock-Watson type composite index results in regions that resemble the BEA regions. But should similarity to the BEA regions be the criterion for the best clustering? And if we produced different clusters using different variables, how should we combine the results of the various clustering exercises?

Second, in any attempt to define regions using clustering analysis, how do we establish confidence intervals for a state's belonging to a particular region or cluster as opposed to any other? Bootstrapping methods are available for computing these confidence intervals.[12] But since the national economy is such a strong force in each state's economic performance, it is difficult to get confidence intervals that will assign states to one and only one region with a high degree of probability.

Third, how do we assign to regions those states isolated from their neighbors in the cluster analysis? None of the clustering exercises assigned all 48 contiguous states to a region.

We consider this exercise a first step in defining regions based on the states' cyclical behavior. Clustering analysis is the most obvious statistical tool for dividing the states into regions, and some comprehensive measure like the Stock-Watson type economic activity index would be the appropriate variable on which to perform the clustering analysis.

[12]For an application of the bootstrapping method, see Goetzmann and Wachter (1995).

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Table 1 Census Regions and Divisions		
Region	**Division**	**State**
Northeast	**New England**	Maine
		New Hampshire
		Vermont
		Massachusetts
		Rhode Island
		Connecticut
	Middle Atlantic	New York
		New Jersey
		Pennsylvania
Midwest	**East North Central**	Ohio
		Indiana
		Illinois
		Michigan
		Wisconsin
	West North Central	Minnesota
		Iowa
		Missouri
		North Dakota
		South Dakota
		Nebraska
		Kansas

Region	Division	State
South	**South Atlantic**	Delaware
		Maryland
		District of Columbia
		Virginia
		West Virginia
		North Carolina
		South Carolina
		Georgia
		Florida
	East South Central	Kentucky
		Tennessee
		Alabama
		Mississippi
	West South Central	Arkansas
		Louisiana
		Oklahoma
		Texas

Region	Division	State
West	**Mountain**	Montana
		Idaho
		Wyoming
		Colorado
		New Mexico
		Arizona
		Utah
		Nevada
	Pacific	Washington
		Oregon
		California
		Alaska
		Hawaii

Table 2 BEA Regions	
Region	**State**
New England	Maine
	New Hampshire
	Vermont
	Massachusetts
	Rhode Island
	Connecticut
Mideast	New York
	New Jersey
	Pennsylvania
	Delaware
	Maryland
	District of Columbia
Great Lakes	Ohio
	Indiana
	Illinois
	Michigan
	Wisconsin

Region	State
Plains	Minnesota
	Iowa
	Missouri
	North Dakota
	South Dakota
	Nebraska
	Kansas
Southeast	Virginia
	West Virginia
	North Carolina
	South Carolina
	Georgia
	Florida
	Kentucky
	Tennessee
	Alabama
	Mississippi
	Arkansas
	Louisiana
Southwest	Oklahoma
	Texas
	New Mexico
	Arizona

Region	State
Rocky Mountain	Montana
	Idaho
	Wyoming
	Colorado
	Utah
Far West	Washington
	Oregon
	California
	Alaska
	Hawaii
	Nevada

Table 3

Results of Clustering on Log Difference of Economic Activity Indexes

Cluster	Contiguous/ Noncontiguous	State	Squared Correlation of Log Difference of State Index with Cluster Component	
			Own Cluster	Next Cluster
Cluster I	Contiguous States **New England**	Maine	0.50	0.13
		New Hampshire	0.36	0.25
		Massachusetts	0.31	0.12
	Two-state Combination	Arizona	0.45	0.06
		Utah	0.36	0.05
	Isolated State	Montana	0.13	0.06
Cluster II	Contiguous States **Mideast**	Pennsylvania	0.54	0.25
		New Jersey	0.46	0.17
		New York	0.44	0.19
		Connecticut	0.33	0.10
		Maryland	0.31	0.16
		West Virginia	0.30	0.08
		Vermont	0.19	0.06

Cluster	Contiguous/ Noncontiguous	State	Squared Correlation of Log Difference of State Index with Cluster Component	
			Own Cluster	Next Cluster
Cluster III	Contiguous States **Great Lakes**	Ohio	0.73	0.36
		Indiana	0.63	0.27
		Michigan	0.54	0.10
		Illinois	0.46	0.23
		Iowa	0.36	0.14
	Isolated State	Delaware	0.25	0.06
Cluster IV	Contiguous States **Southeast**	Tennessee	0.60	0.32
		Arkansas	0.50	0.21
		Alabama	0.48	0.23
		Georgia	0.44	0.23
		Missouri	0.40	0.25
		Oklahoma	0.39	0.22
		Virginia	0.39	0.21
		Mississippi	0.37	0.20
		North Carolina	0.37	0.12
		South Carolina	0.36	0.16
		Kentucky	0.34	0.22
		Florida	0.26	0.13
	Isolated State	Rhode Island	0.24	0.15

Cluster	Contiguous/ Noncontiguous	State	Squared Correlation of Log Difference of State Index with Cluster Component	
			Own Cluster	Next Cluster
Cluster V	Contiguous States **Southwest/ Plains**	Colorado	0.42	0.18
		Nebraska	0.39	0.20
		Texas	0.33	O.16
		New Mexico	0.32	0.14
		Wisconsin	0.31	0.19
		Minnesota	0.27	0.15
		Louisiana	0.27	0.09
		North Dakota	0.26	0.04
		South Dakota	0.24	0.14
		Kansas	0.18	0.09
		Wyoming	0.12	0.02
Cluster VI	Contiguous States **Far West**	Oregon	0.59	0.06
		Washington	0.46	0.12
		Nevada	0.35	0.04
		Idaho	0.32	0.05
		California	0.31	0.12

Figure 1
BEA Regions

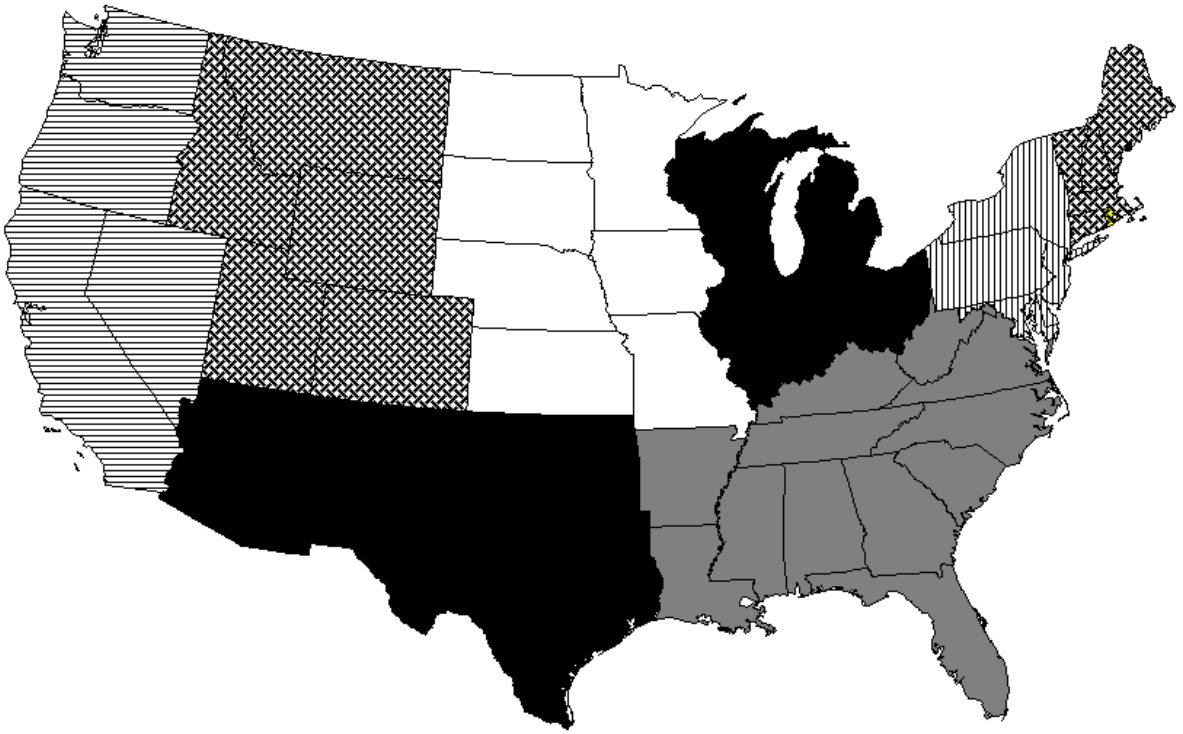

Figure 2
Cluster Analysis
Log Difference of State Economic Activity Index

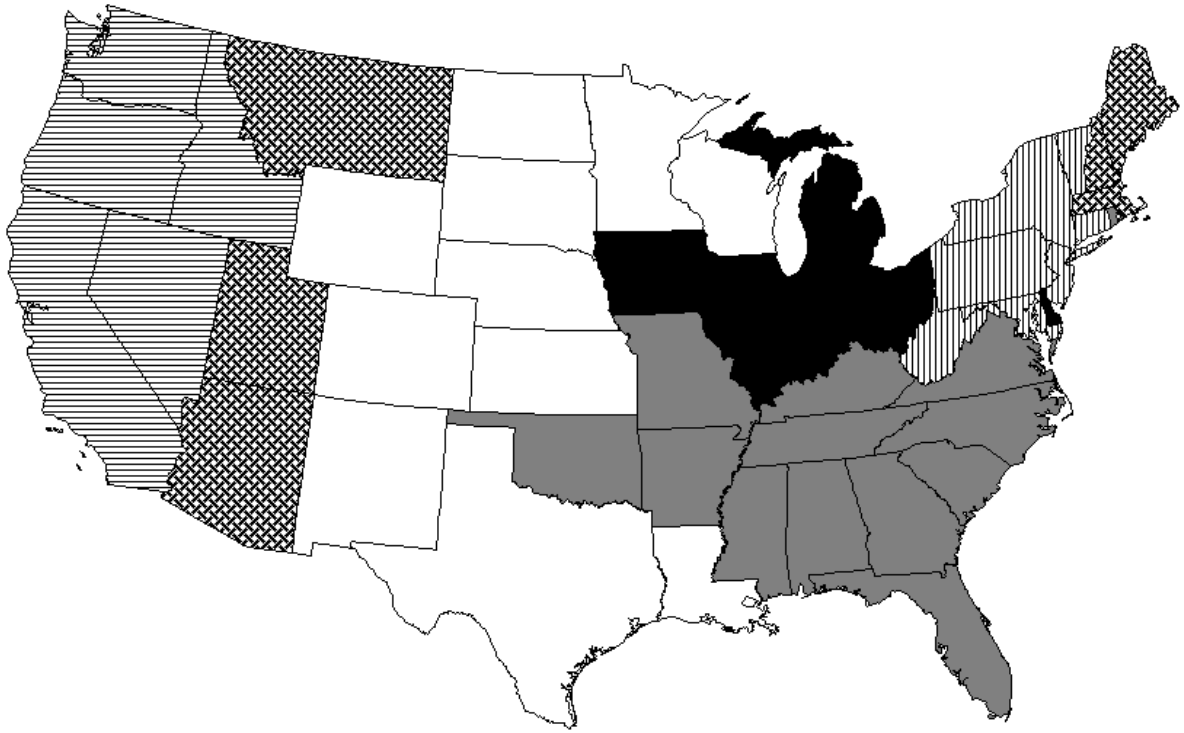

Figure 3
Cluster Analysis
Log Difference of Nonfarm Employment

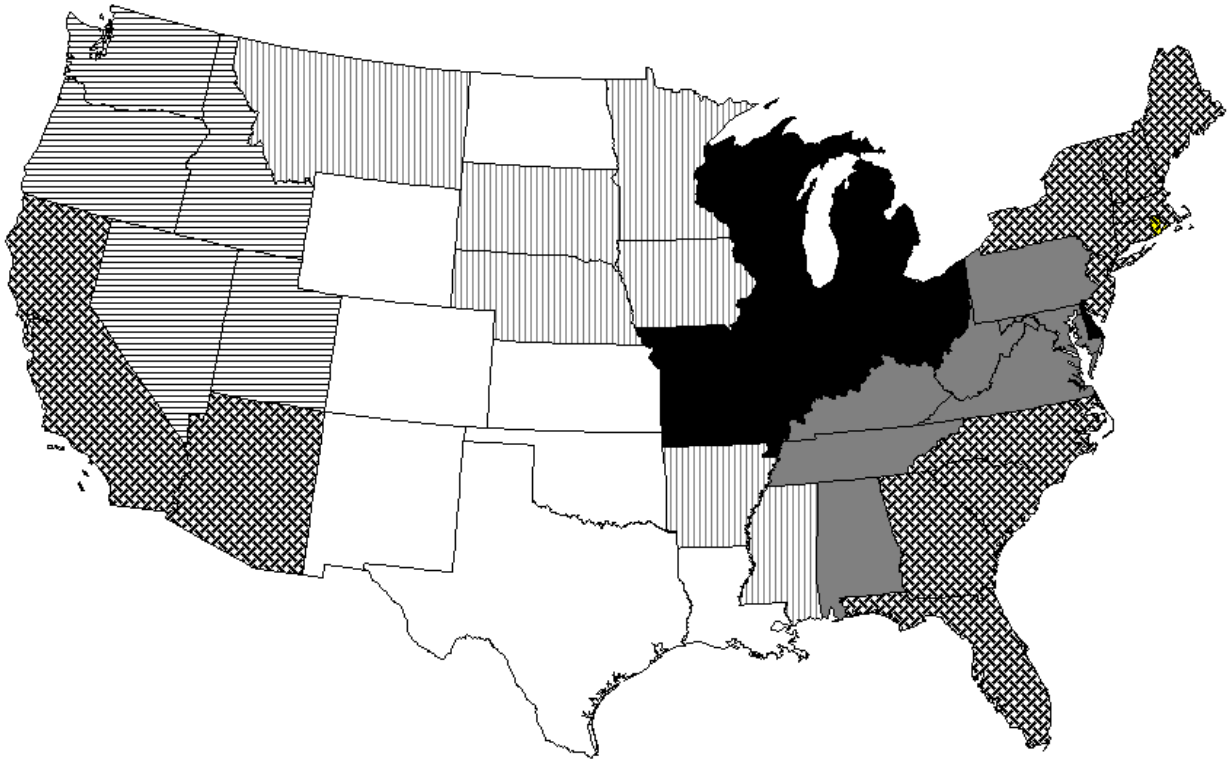

Figure 4
Cluster Analysis
First Difference of Unemployment Rate

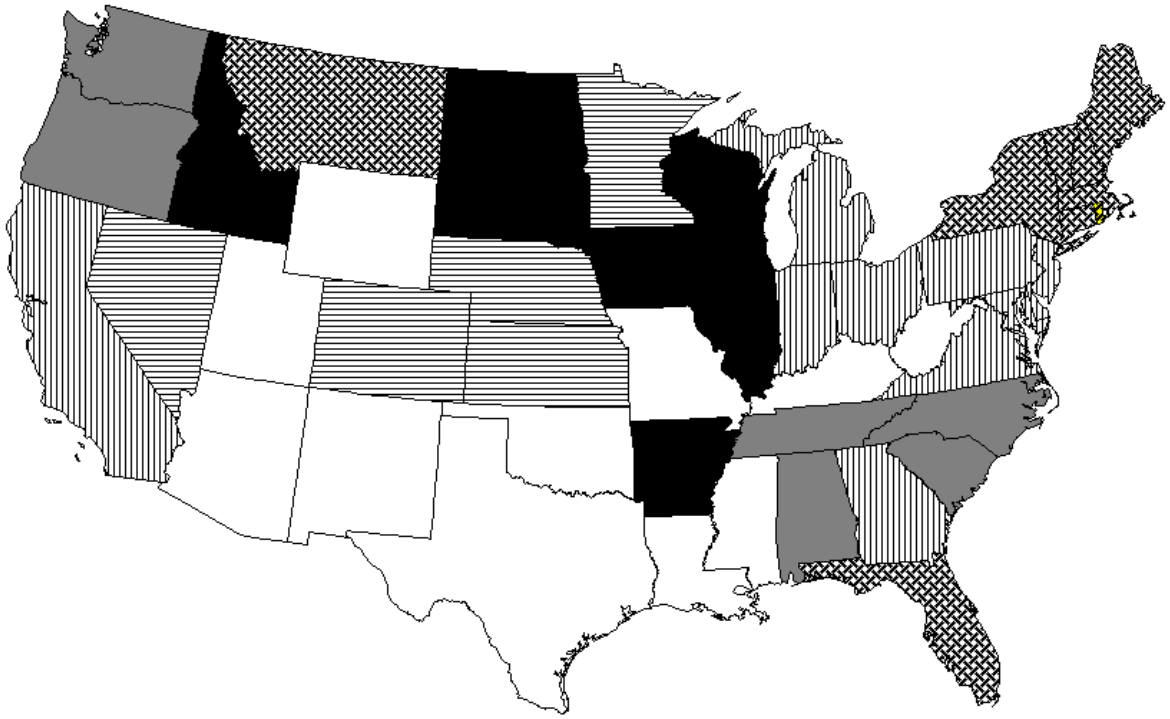

Figure 5
Cluster Analysis
Log Difference of Average Hours Worked