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Employment Change in LDs of West Virginia: A Dynamic Spatial Shift- Share Analysis

Janaranjana Herath[1,*], Peter Schaeffer[2], Tesfa Gebremedhin[2]

[1]Tillman School of Business, Mount Olive College/University, North Carolina, USA
[2]Davis College of Agriculture, Natural Resources and Design, Division of Resource Management, West Virginia University, USA
*Corresponding author: sbandara@moc.edu

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Abstract This paper uses dynamic spatial shift-share analysis to examine employment change in local development districts (LDs) of West Virginia for the period of 1976 to 2007. This paper differs from the standard shift-share analysis by combining the dynamic shift-share with the spatial shift-share and decomposing the employment change of selected sectors into four effects: state growth effect, industry mix effect, neighborhood competitive effect, and state competitive effect. Distance between main cities of local development districts were considered in developing the distance based weight matrix for measuring neighborhood competitive effects. Results describe the changing pattern of employment of the ten selected sectors namely farm employment, mining, construction, manufacturing, wholesale and retail trade, transportation and public utilities, finance insurance and real estate, services, government, and agricultural services of the eleven local development districts of West Virginia. In many LDs' service, finance, insurance and real estate, construction, and government sectors have been the leading contributors of employment growth in 32 year period. Even though, mining and manufacturing are two main sectors in the economy of West Virginia, employment growth of mining is reported only in a few LDs. Manufacturing employment is declining in all LDs. All LDs have some sectors that are adding employees. Investing them might accelerate economic growth. Neighborhood competitive effects show potential spatial impacts on several sectors.

Keywords: *dynamic, spatial shift-share analysis, local development districts, West Virginia*

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1. Introduction

A regional economy consists of various sectors with a variety of economic potentials. A change in any of these sectors directly or indirectly affects the overall growth of the economy [1] and understanding the comparative advantage of these sectors becomes important in the development of decision making of the region [2,3,4,5]. The identification of comparative advantaged sectors becomes more important in less-developed regions like West Virginia than in the developed regions.

West Virginia is a poor state in the Appalachian and southeastern regions. The total population of West Virginia is about 1.85 million and nearly 56 percent live in urban areas while the rest are in rural areas [6]. West Virginia reported the 5th highest poverty rate, 17.4 percent during the year 2008 [7] and at present, the rural poverty rate is 19.9 percent, a figure five points higher than the urban poverty rate. The unemployment rate is 9.5 percent, which is one of the highest rates compared to other states [7]. The average population density is about 75 people per square mile, and the per capita personal income was $32,219 in 2009, 17.7 percent below the national per capita income of $39,138 [8]. The per capita income in the rural area was $29,200 compared to $33,578 in the urban area in 2008 [9]. Manufacturing, services, mining and tourism (an emerging sector) are the major economic sectors in West Virginia. The production of bituminous coal, natural gas, stone, cement, salt and oil contribute significantly to the state's economy. Farming is practiced throughout West Virginia, but not in a form of large scale cash-crop agriculture [9]. Nearly 82 percent of total agricultural production comes from livestock with the remaining 18 percent from crops. Major manufacturing goods in West Virginia include machinery, plastic and hard wood products, fabricated metals, chemicals, aluminum, automotive parts and steel. The largest share of gross product in the service sector is given by the community, business and personal services groups and most of these services are provided by private health care, law firms, repair shops and hotels. Tourist activities such as skiing and white-water rafting are popular and bring significant revenue to West Virginia.

According to the economic outlook of 2010 and 2011 [8], economic gains in West Virginia are slow and moderate compared to the national rates. To enhance economic growth, an understanding of the prevailing employment pattern within potential regions and industries is essential. Thus, the main objective of this paper is to analyze the employment changes in local

development districts (LDs) of West Virginia as compared to the employment change in the state.

2. Local Development Districts of West Virginia

West Virginia is divided into eleven local development districts (LDs) each with a regional development council to provide comprehensive planning of all types for the state (Figure 1). Local development district 1 (LD1) includes the counties of McDowell, Mercer, Monroe, Raleigh, Summers, and Wyoming while Beckley in Raleigh County and Princeton, Bluefield, in Mercer county are the main cities in the region. LD2 includes Cabell, Lincoln, Logan, Mason, Mingo, and Wayne counties and Huntington in Cabell County is the main city of the district. LD3 consists of Boone, Clay, Kanawha, and Putnam County, and Charleston in Kanawha County is the main city. LD4 includes Fayette, Greenbrier, Nicholas, Pocahontas, and Webster County. The main city is Oak Hill in Fayette County. Calhoun, Jackson, Pleasants, Ritchie, Roane, Tyler, Wirt, and Wood County are included in LD5. Parkersburg in Wood counties is the main city of LD5. There are six counties in LD6, Doddridge, Harrison, Marion, Monongalia, Preston, and Taylor. Morgantown and Clarksburg are the main cities in the district. LD7 consists of Barbour, Braxton, Gilmer, Lewis, Randolph, Tucker, and Upshur. Elkins in Randolph County is the main city. LD8 includes five counties of Grant, Hampshire, Hardy, Mineral, and Pendleton County. Keyser in Mineral County is the small city in LD8. LD9 consists of Berkeley, Jefferson, and Morgan County. Shepherdstown and Kabletown in Jefferson and Martinsburg in Berkeley are the main cities in LD9. LD10 includes Marshall, Ohio, and Wetzel County. Wheeling is the main city. LD11 includes only two counties, Brooke, and Hancock. Weirton in Hancock County is the main city.

The paper is organized into six sections. Section 3 provides the literature review. Section 4 covers the methodology and data sources. Section 5 describes the empirical results and analysis. Section 6 presents the conclusions and policy implications.

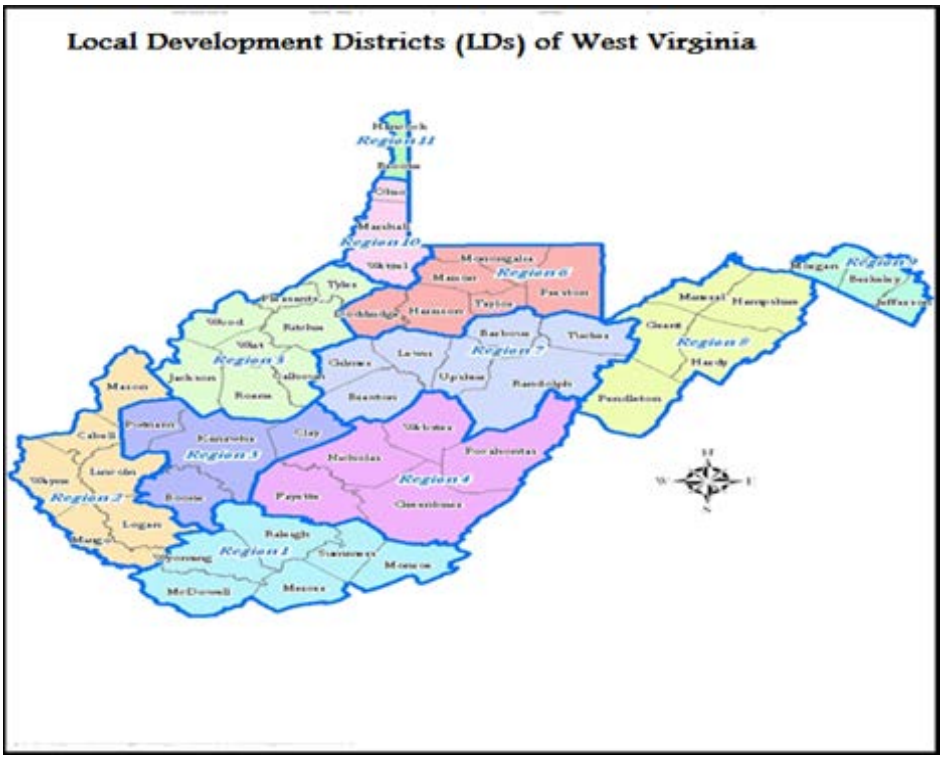

Figure 1. Local development districts (LDs) of West Virginia

3. Literature Review

The shift share method of analyzing regional growth was originated in 1940s by Daniel Creamer and was described as an analytical technique for understanding the regional development of a national economy by Dunn in 1960 [10]. According to Dunn [11], the main feature of shift share analysis is the computation of geographical shifts in economic activity. The analysis has been used extensively since its formal inception in the fields of regional economy, political economy, urban studies, geography and marketing in the last 40 to 50 years [12,13,14,15,16,17]. The technique is generally used to describe historical growth trends, forecast regional growth, analyze the effects of policy initiatives, or develop strategic planning for communities [18].

With Isard's [19] finding that any spatial unit is affected by the positive and negative effects transmitted from its neighboring regions, numerous extensions and modifications were attempted to make up the drawbacks of standard shift-share analyses. Cliff and Ord [20,21,22] studied the problem of spatial autocorrelation. Hewings [23] included the spatial interaction in the shift-share model. Nazara and Hewings [24] and Mayor and Lopez [25] considered interregional interaction in the decomposition analysis by incorporating a spatial structure within shift-share analysis. Fernandez and Menendez [26]

used spatial shift share analysis in measuring employment growth in Spain. The technique was applied to tourism in China, based on international tourism receipts from 1995 to 2004 [27]. The study aimed at probing into the spatial competitiveness of international tourism in Jiangsu Province in comparison with its neighbors.

In 1988, Barff and Knight III developed the idea of dynamic shift-share analysis [28]. While Harris et al. used dynamic shift share analysis to investigate the economic impacts of Nevada [29], Markusen et al. used dynamic shift share analysis in tracking the sensitivity of regional growth to international flows, decomposing shift-share components into import, export, and domestic market segments and a productivity component [30]. Wilson et al. used dynamic shift share analysis to examine the export performances of China in electronics compared to the East Asian Newly Industrialized Economies exporting to the U.S, European Union and Japan between 1988 and 2001 [31]. Herath et al. used dynamic shift share analysis in measuring economic growth in West Virginia [32].

In the context of regional economic growth analysis, various methods including optimization technique, shift-share, economic base, input-output, and benefit-cost analysis, have been used [18,33]. Even though these models show some variations in measurement, precision, accuracy, and simplicity, each method of analysis has been used as a guide for policy makers and researchers in answering basic questions related to state or regional problems [34]. Shift share analysis, in particular, compared to the other methods, is widely used by regional development practitioners, where data limitations are minimal [4,33]. Furthermore, shift share analysis is important in selecting and understanding the key leading sectors in a region which needs developing local industry partnership.

4. Methodology

4.1. Standard Shift-Share Model

The standard shift-share model decomposes a region's employment growth into three effects as state growth effect (SGE), industrial mix effect (IME) and competitive effect (CE). NGE which is the part of change in total employment in a region ascribed to the rate of growth of employment at the state level, IME is the amount of change the region would have experienced if each of its industrial sector had grown at the state rates, less the SGE and CE is the difference between the actual change in employment and the employment change expected if each industrial sector grows at the state rate. The sum of these three effects gives the actual change in total employment within a region over a considered time period.

Assume e_{ij}, r, r_i, and r_{ij} represent the employment of industry i in region j, the growth rate of state employment, the employment growth rate of industry i in the state, and the employment growth rate of industry i in region j. Then, the employment change (Δeij) could be written as follows (equation1: where e_{ij}' is the employment for the end year of the considered time period and eij is the beginning year of the considered time period.

$$\Delta e_{ij} = e_{ij} * r + e_{ij} * (r_i - r) + e_{ij} * (r_{ij} - r_i) \quad (1)$$

$$-r = \frac{\sum_{i=1}^{s}\sum_{i=1}^{R}(e_{ij}^{'} - e_{ij})}{\sum_{i=1}^{R}\sum_{j=1}^{R} e_{ij}}$$

$$r_i = \frac{\sum_{j=1}^{R}(e_{ij}^{'} - e_{ij})}{\sum_{j}^{R} e_{ij}}$$

$$r_{ij} = \frac{(e_{ij}^{'} - e_{ij})}{e_{ij}}$$

The SGE is shown by e_{ij}* r ; IME is shown by e_{ij}*(r_i – r), CE is shown by e_{ij}*(r_{ij} – r_i). The total employment change can be determined by adding the three effects.

4.2. Dynamic Shift Share Model

The dynamic shift-share analysis calculates the three effects annually and then summarizes the results over the study time period [28]. Unlike the standard shift share analysis which considers only the origin and end years of a time period, this method considers all the annual changes of employment. Thus, the weak assumption of no or minimum employment changes within the period of origin and end year could be overcome by dynamic approach. The employment change (*Δeij)* can be shown as follows. As in the standard shift share analysis, e_{ij}^{t-1}* r^t shows the SGE, $eijt^{-1}$ * (r_i^t – r^t) shows the IME, and e_{ij}^{t-1} *(r_{ij}^t – r_i^t) indicates the CE.

$$\Delta e_{ij}^{\ t} = e_{ij}^{\ t-1} * r^t + e_{ij}^{\ t-1} * (r^t{}_i - r^t) + e_{ij}^{\ t-1} * (r_{ij}^{\ t} - r_i^t) \quad (2)$$

$$r_i = \frac{\sum_{j=1}^{s}\sum_{j=1}^{R}(e_{ij}^{t} - e_{ij}^{t-1})}{\sum_{j=1}^{s}\sum_{j=1}^{R} e_{ij}^{t-1}}$$

$$r_i^t = \frac{\sum_{j}^{R}(e_{ij}^{t} - e_{ij}^{t-1})}{\sum_{j=1}^{R} e_{ij}^{t-1}}$$

$$r_{ij}^t = \frac{(e_{ij}^{t} - e_{ij}^{t-1})}{e_{ij}^{t-1}}$$

4.3. Spatial Shift Share Model

Standard shift-share model assumes that regions are independent from each other and there are no any positive or negative effects from neighboring regions. This assumption is weak and can be overcome with spatial shift share models where neighboring impacts on employment changes can be estimated. Thus, the results of a spatial shift share model are more accurate and useful than a standard shift share analysis.

The districts are spatial sub-units within a country or a state and the performances of a particular district may be affected by the performance of surrounding districts. Such influences can be captured using a spatial structure within the standard shift share analysis. A weight matrix W (W is an R*R matrix and R is the number of districts considered) indicates the regional interaction. The r^{th} row shows the structure of region r's interaction with all other regions in

the system while W_{rs} represents for the degree of interaction between region r and s. Zero entries mean that two regions have no interaction, while non-zero entries mean that two regions interact. The weight matrix W is usually standardized by rows that the sum of each row in the matrix equal to unity.

$$0 \le W_{rs} \le 1$$
$$\sum_j W_{rs} = 1$$

One way of deciding W is to consider the distance between the major cities of the two regions. The first law of geography states that all locations on a map are interrelated and the interaction of closer places is stronger than that of regions far away from each other. Thus, the regional interaction is an inverse relationship with geographic distances.

4.4. Dynamic Spatial Shift Share Model

The dynamic spatial shift share model combines the dynamic shift share and spatial shift share models to produce more accurate estimations. With the spatial weight matrix, the employment change is decomposed into four components as SGE, IME, NeCE, and SCE. NeCE is the neighborhood competitive effect and SCE is the state competitive effects which were derived by dividing the CE into two rates [35].

$$\Delta e_{ij}^{\,t} = e_{ij}^{\,t-1} * r^t + e_{ij}^{\,t-1} * (r^t{}_i - r^t) + e_{ij}^{\,t-1} * (r_{ij}^{\,t} - r_{ij}^{\,t^*}) + e_{ij}^{\,t-1} * (r_{ij}^{\,t^*} - r_i^{\,t}) \quad (3)$$

$$r_{ij}^{\,t^*} = \frac{\sum_{LD} W_{jk} e_{ik}^{t} - \sum_{LD} W_{jk} e_{ik}^{t-1}}{\sum_{LD} W_{jk} e_{ik}^{t-1}}$$

$$W_{jk} = \frac{1}{\sqrt{d_{jk}}}$$

In equation 3, d_{jk} is the shortest road distance between the main cities of LDs of j and k, and $r_{ij}^{\,t^*}$ is the weighted employment growth rate of sector *i* in LD_j. The NeCE, $e_{ij}^{\,t-1} * (r_{ij}^{\,t} - r_{ij}^{\,t^*})$ measures the difference between real employment growth and employment growth at the weighted growth rate. When the real growth rate of industry *i* in the region j is higher than the weighted growth rate of the same industry in the same region, the effect is positive. The SCE $e_{ij}^{\,t-1} * (r_{ij}^{\,t^*} - r_i^{\,t})$ measures the difference between the employment growth at the weighted growth rate and employment growth at the state growth rate for the same industry. When the state growth rate of industry *i* is smaller than the weighted growth rate of industry i in the region j, the NCE is positives.

4.5. Types and Sources of Data

As the study utilizes shift share analysis of employment growth in West Virginia, a panel data set is used for a period of 32 years (1976 to 2007) based on the data availability. The U.S. Bureau of Labor Statistics and U.S. Bureau of Census were the main sources of data. As the interest was to examine the growth of various sectors of local development districts of West Virginia, the data collected on total employment was categorized into ten main sectors (1) farm employment (FRM), (2) mining (MIN), (3) construction (CON), (4) manufacturing (MAN), (5) wholesale and retail trade (W&R), (6) transportation and public utilities (T&U), (7) finance, insurance and real estate (FIR), (8) services (SER): professional, personal and other (9) government (GOV), and (10) agricultural services, forestry fishing and others (AGR). Employment change for West Virginia was considered as the national level in the study. Also, distances between main cities of the local development districts were considered in developing the distance base weight matrix for NeCEs.

Table 1.Total Employment changes in LDs within 1976-2007

LD	SGE	IME	NeCE	SCE	Emp Change
LD1	25255	12007	-18301	-37244	-18283
LD2	31938	11634	-7124	-37037	-589
LD3	46242	34988	6739	-83776	**4194**
LD4	14644	5398	2341	-27719	-5335
LD5	23375	4018	3903	-33261	-1966
LD6	39700	-550	-14342	-27906	-3097
LD7	13409	4073	-812	-14281	**2389**
LD8	8810	-119	1815	-8192	**2314**
LD9	13978	7199	-1399	5650	**25428**
LD10	14977	-9474	-13982	-24037	-32516
LD11	7711	-5373	-12201	3848	-6015

5. Empirical Results and Analysis

Table 1 depicts the total employment changes with its components. SGE shows employment growth that would have occurred if the local economy had grown at the same rate as the state economy. Thus, the positive values for all the development districts indicate that all regions could gain in employment if growth occurred at the same rate as the state. The IME measures the amount of local employment sector growth compared to the state level. It can be used in identifying the fast or slow growing sectors in an economy. The positive values for LD1, LD2, LD3, LD4, LD5, LD7 and LD9 mean that those regions are growing faster than the state economy. The negative values of IME in the other districts indicate slower growth compared to the state employment growth. The NeCE shows the difference between the real employment growth and the employment growth at the weighted growth rate. Positive effects of LD3, LD4, LD5, and LD8 indicate that the total growth rates of the districts are higher than the

weighted growth rate of the same region. In other words these districts are leading forces in terms of total employment growth. The SCE measures the difference between the employment growth at the weighted growth rate and employment growth at the state growth rate for the same industry. A positive value of SCE means that the local economy has been successful in attracting investment to a particular sector. Moreover, a positive competitive effect indicates the comparative advantage for a region in a particular sector. Thus, the positive values of LD9 and LD11 indicate the potential competitive advantage compared to the other development districts which are negative in SCE. Finally, employment change indicates local development districts of LD3, LD7, LD8, and LD9 had an employment growth while the others had an employment decline within the study period.

Table 2 indicates the state growth effects of each development district with sectors. All sectors of all the development districts are positive in value indicating the potential employment changes if the local sector had grown at the same rate of state economy. In all local development districts service sector indicates the highest contribution to the SGE. In many development districts, the next highest contributing sector is the whole sale and retail trade. Mining, one of the leading sectors in West Virginia seems to be significant only for LD1, LD2, LD3, LD5, and LD6. Contribution of the agricultural sector to SGE is very low in all LDs within 1976 to 2007.

Industrial mix effects of each sector of LDs are shown in Table 3. In all sectors of all LDs, the service sector indicates a fast growth of employment compared to the state level in the last 32 years. Farming, mining, manufacturing, wholesale and retail, transport and utilities, and government service sector indicate negative IME for all LDs, slow growth of employment compared to the state level. Local development districts of LD6, LD7, LD8 and LD9 indicate positive values of IME for construction sector. Except LD10 finance, insurance and real estate sector also indicates a fast growth. The agricultural service sector shows positive values in LD10, and LD11.

Table 2. NGE in LDs within 1976-2007

SEC	LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	LD9	LD10	LD11
FRM	528	480	230	556	829	856	693	836	405	262	52
MIN	1401	1364	1386	603	701	1277	520	143	13	267	74
CON	1162	1451	2318	618	1230	1712	637	521	834	659	191
MAN	858	2547	2596	1146	3442	2360	1214	1331	1355	1287	2571
W&R	4730	5738	8258	2415	4056	6117	2086	1118	2464	2917	1059
T&U	1009	1743	2337	540	650	1491	464	280	239	502	222
FIR	948	1228	2531	517	933	1492	433	297	677	686	264
SER	**10658**	**12933**	**19934**	**5961**	**8494**	**16992**	**5242**	**2935**	**5542**	**6438**	**2598**
GOV	3872	4331	6470	2207	2948	7260	2042	1301	2351	1907	658
AGR	89	125	185	80	92	143	79	48	98	51	22

Table 3. IME for LDs within 1976-2007

SEC	LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	LD9	LD10	LD11
FRM	-780	-732	-332	-846	-1206	-1230	-987	-1285	-710	-387	-79
MIN	-11163	-8621	-10430	-4521	-3398	-9642	-3737	-1251	-73	-8620	-454
CON	-66	-427	10	-117	-232	15	18	66	197	-17	-56
MAN	-3974	-11327	-12654	-4563	-15322	-10546	-5082	-5414	-5579	-6037	-11814
W&R	-3931	-4653	-7334	-2240	-4328	-5848	-2099	-1195	-3004	-2149	-1058
T&U	-2585	-4163	-5837	-1433	-1605	-3636	-1187	-868	-722	-1244	-555
FIR	9130	11347	26139	4776	9937	13688	4516	3091	6477	-6037	2515
SER	**26251**	**30980**	**46644**	**14925**	**20635**	**20635**	**13189**	**7038**	**11189**	**15216**	**6185**
GOV	-622	-710	-1095	-399	-426	-3871	-351	-243	-566	-272	-92
AGR	-252	-61	-124	-184	-38	-115	-206	-56	-10	72	33

Table 4. NeCE for LDs within 1976-2007

SEC	LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	LD9	LD10	LD11
FRM	269	-453	1156	0	169	-114	51	-1271	-927	77	-17
MIN	-6966	747	2815	1788	1671	-13593	3048	29	-189	-4205	-4470
CON	-2631	1448	-1742	1061	-153	-4468	750	1201	57	-4272	88
MAN	1638	717	-3911	-2054	4903	-7483	2876	1572	-1026	35	-591
W&R	-4998	-2723	-6214	2234	3545	-828	206	570	2493	-1230	267
T&U	-2467	648	-4250	1063	958	-2543	270	-135	-162	-669	531
FIR	-2602	-1779	-3682	1351	-411	-963	203	502	125	-571	160
SER	-427	-5747	26256	-1960	-6277	12226	-7426	-739	0	-2204	-8257
GOV	199	62	-2334	-50	-802	5116	-1225	-94	0	-760	194
AGR	-316	-44	-1356	-1092	298	-1692	434	-9	-1769	-184	-106

Table 5. SCE for LDs within 1976-2007

SEC	LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	LD9	LD10	LD11
FRM	4	295	-1035	96	415	717	477	635	-439	-96	-3
MIN	-1925	2792	-913	-2927	1740	14033	704	224	80	1325	4486
CON	1112	424	2089	-583	254	3590	246	36	-57	1962	-548
MAN	301	-2464	726	2240	-3806	8026	679	691	3773	-2548	-4301
W&R	4998	2723	3261	-1388	-3545	3464	923	507	2227	-2536	-1336
T&U	1456	-523	3603	-426	-242	3290	264	252	-373	7	531
FIR	-6748	-10081	-19940	-4878	-8925	-11002	-3947	-2729	-4218	-6226	-2630
SER	-36609	-28493	-72339	-20698	-17903	-51003	-14597	-8415	-2288	-14768	8257
GOV	-504	-1839	-473	-134	-1344	-671	960	626	5425	-1113	-639
AGR	671	127	1244	980	95	1649	10	-17	1521	-42	30

Neighborhood competitive effect (NeCE) of each LD is shown in Table 4. LD1 indicates positive values for the sectors of farming, manufacturing, and government sector. The values are positive as the real growth of these sectors is higher than the weighted growth rate of neighbors. Thus, these sectors are the leading sectors for LD1for the period from 1976 and 2007. LD2 has a lead in mining, construction, manufacturing, transport and utilities while LD3 leads in services, farming and mining than its neighbors. Likewise each LD has leading sectors indicating a fast growth within the study period. The negative values of NeCE indicate that real employment of the LD is slower than the weighted average growth of the neighbors.

Table 5 shows the state competitive effect for all sectors. High positive values of wholesale and retail trade, construction, transport and utilities of LD1 indicate the success in attracting investment to these sectors. Negative NCEs indicate that those sectors are losing their shares to other development districts of West Virginia. According to Table 5, mining, wholesale and retail trade, and construction sectors have been the most successful sectors of LD2 in the last 32 years. The positive values of construction, wholesale and retail trade, transports and utilities and agricultural service sectors indicate the economic gaining sectors of LD3. Regarding LD4, SCE values are positive for mining, farming, construction and agricultural services sectors indicating that those sectors have been successful in attracting investments. Positive SCE for farming, mining, construction, and agriculture sector indicate that those sectors have been successful in attracting investments to LD5 for the period from 1976 to 2007. With the exceptions of finance insurance and real estate, service, and government sector, all other sectors in LD6 have been successfully contributing to the economic gains of the district. SCE values of LD7 indicate that only finance insurance and real estate, and service sectors have been losing shares to the other regions in the last 32 years. LD8 results indicate that finance insurance and real estate, service, and agriculture sector have negative values for SCE. Government services, manufacturing, wholesale and retail trade, and mining have been the most attracting sectors for LD9. LD10 has been attracting investments to mining and construction sectors successfully while LD11 has been successful in mining, services, and transport and utilities.

Table 1, Table 2, Table 3, Table 4, and Table 5 show employment changes in local development districts of West Virginia for the period of 1976 to 2007. Results clearly indicate employment growth in some LDs while others indicate a decline. Sector basis analyses show the importance of certain sectors in employment growth of each LD which can help develop better development planning. For instance, in LD1 agricultural services, transport and utilities, services, mining and farming have been contributing the employment growth from 1976 to 2007 (Table 6). Thus, investing in these sectors of LD1 would be more fruitful with the understanding of relevant niche markets. For instance, in the service sector, which includes the services of business, health, engineering, management, professional services, hotels, and personal services, scrutinizing the most effective industry could benefit more economic gains. Moreover, in LD2 agriculture, government, manufacturing, and transport and utilities have been playing major roles in employment growth (Table 6).

Table 6. Sector employment change in LDs within 1976-2007

SEC	LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	LD9	LD10	LD11
FRM	20	-411	19	-195	208	229	235	-1085	-1671	-144	-47
MIN	-18653	-3718	-7141	-5057	714	-7925	535	-855	-170	-11233	-364
CON	-423	2896	2676	979	1099	848	1651	1824	1030	-1668	-324
MAN	-1177	-10526	-13243	-3230	-10783	-7643	-314	-1821	-1478	-7262	-14135
W&R	799	1085	-2029	1021	-272	2905	1116	1000	4180	-2998	-1068
T&U	-2587	-2295	-4147	-256	-239	-1397	-189	-472	-1019	-1403	730
FIR	728	715	5048	1766	1534	3216	1205	1160	3062	-12149	308
SER	-127	9672	20494	-1772	4949	-1150	-3592	819	14443	4682	8784
GOV	2945	1845	2568	1625	377	7834	1425	1778	7211	-238	121
AGR	192	148	-51	-216	447	-14	317	-34	-160	-103	-20

Results indicate that mining, one of the major employment sectors, has been gaining in some LDs (LD5, LD7) even though employment decline in the mining sector have been reported for West Virginia within the period of 1976 and 2007 (Table 6). However, the industry currently faces a significant level of regulatory risk related to concerns about climate change and water quality [8]. The manufacturing sector reports employment declines in all LDs in the study period indicating the importance of revitalizing prevailing policies. However, according to the economic outlook for 2011 of West Virginia, there is a potential for employment gains in durable manufacturing sector. But the non-durable manufacturing sectors are losing jobs especially for chemical products [8]. The farming sector in West Virginia has known an employment decline during the past three decades, but LD1, LD3, LD5, LD6 and LD7 indicate an employment growth within the period. Thus, these LDs are potential gainers of investing in farming in the future. The government sector, service sector, and financial insurance and real estate sector seem to have been the most advantageous sectors for many LDs in the last three decades (Table 6).

6. Conclusions and Policy Implications

The dynamic spatial shift share analysis eliminates some of the problems associated with the traditional comparative static approach and provides a more accurate allocation of employment changes among the three shift share effects. The technique is appropriate in measuring the economic effect of various regions in West Virginia. In many LDs service, finance, insurance and real estate, construction, and government sectors seem to be the leading contributors of employment growth in the last 32

years and investment in these sectors would result more employments. The conclusion is supported by the economic outlook of 2011 which forecasts that more employment growth is expected to be generated in the health care; professional and business services; and trade, transportation, and utilities sectors in West Virginia within 2010-2015.

Even though mining and manufacturing are two major industries in the economy of West Virginia, significant employment declines, especially in the manufacturing sector suggest that it is not a significant contributor to employment growth. Interestingly, each LD has a few employment gaining sectors, which could be further invested to accelerate economic growth. Identification of investment priorities in the niches of these potential sectors and implementing a comprehensive development policy could substantially enhance the development of West Virginia. The spatial effects of neighboring regions provide interesting insights of employment changes that make easier in investment planning. The notion of comparative advantage could enhance the efficiency in such a policy.

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