

ANALYSIS OF RECENT CHANGES IN ARKANSAS PERSONAL INCOME: 2007 – 2009: A SHIFT-SHARE APPROACH

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Abstract

This paper provides an analysis of changes in personal income of Arkansas compared to the personal income changes in the United States and the Southeast Region. Shift-share is used to decompose personal income changes into three components: (1) overall-growth share, (2) differential-composition share, and (3) sector-competitive share. The period, 2007-2009, is examined to provide information on how Arkansas sectors reacted to the recent recession.

Introduction

The measure of economic activity chosen for analysis in this paper is personal income. Personal income is the current income received by residents from all sources. Transfers from government are included, but transfers among individuals are excluded. Thus, personal income is a good measure with which to compare economic performance of different entities (national, regional, and state).

Shift-share analysis has a long history in regional studies (see Perloff, et. al. (1960), Brown (1969) and Buck (1970) for early examples of the technique's use). The original development and use of shift-share analysis was to analyze regional growth, particularly employment growth. However, the technique is easily adapted to analyze changes in gross domestic product and/or personal income for states or regions, as in Rice and Horton (2009). Shift-share requires two entities: (1) the whole and (2) a part of the whole where the whole is generally a country or a region and a part of the whole can be a region or a state.

In this paper, three comparisons will be made: (1) the United States (the whole) versus Arkansas (the part), (2) the Southeast Region (the whole) versus Arkansas (the part), and (3) the United States (the whole) versus the Southeast Region (the part). The analysis involves partitioning the total change (TC) of the part into three components on a sector by sector basis. The three components are: (1) overall-growth share (OGS), (2) differential-compositional share (DCS), and (3) sector-competitive share (SCS). Thus

$$TC(\text{sector}) = OGS + DCS + SCS$$

$$TC(\text{part}) = \Sigma[OGS] + \Sigma[DCS] + \Sigma[SCS]$$

The first term, overall-growth share (OGS), assumes that each sector has changed by the same percentage rate as the change of the whole (using the overall percentage change). The second term, differential-compositional share (DCS), focuses on the difference between the overall part performance rate and general overall performance rate. This difference is used to calculate the amount of change attributable to the differential-compositional component. A positive DCS identifies a sector as fast-growth, and a negative DCS identifies a sector as slow-growth. The third component, sector-competitive share (SCS), focuses on the difference between the sector change rate of the part and the sector change rate of the whole. A positive SCS indicates a sector of the part that is increasing at a faster rate than the corresponding sector of the whole. A negative SCS indicates that the sector of the part is not keeping pace with the growth rate of the corresponding sector of the whole.

Analysis

Aggregate change

As previously noted, the analysis of personal income changes for 2007-2009 has three comparisons: (1) the United States versus the Arkansas, (2) the Southeast Region versus Arkansas, and (3) the United States versus the Southeast Region. Personal income is used in this analysis because it contains payments to individuals not included in Gross Domestic Product (GDP). Table 1 presents the percentage change in total personal income between the years 2007 and 2009.

Table 1
Percentage Change in Personal Income
2007-2009

	Personal Income (millions of dollars)		Percentage Change
	2007	2009	
United States	11,899,853	12,165,474	2.23
Southeast Region	2,727,083	2,798,462	2.62
Arkansas	89,524	93,685	4.65

Source: Personal Income Data for Tables 1, 2, 3, and 4 obtained from “Regional Economic Accounts,” Bureau of Economic Analysis: <http://www.bea.gov/regiona>. All computations in tables are the authors’.

It is interesting to note that Arkansas personal income (for period, 2007-2009) had a percentage increase (4.65%) that exceeded both the United States (2.23%) and the Southeast Region (2.62%). These results suggest that Arkansas has some sectors of its economy that are somewhat more recession-resistant than those of the nation and region.

The shift-share analysis results are presented in Table 2, Table 3, and Table 4. Beginning with Table 2 (the United States versus Arkansas) the totals row (bottom right) shows the change in Arkansas personal income to be \$4,161 million (\$93,685 - \$89,524) (note: sometimes the sums do not much due to rounding). The next column headed "Overall-Growth" presents the personal income growth that Arkansas would have experienced had its personal income grown at the exact same percentage rate as the overall percentage change of the United States personal income, an amount of \$1,998 million $[(0.0223)*(\$89,524) = \$1,998]$. However, Arkansas personal income increased by the amount of \$4,161 million, which is \$2,163 (\$4,161 - \$1,998 million more than the growth that would have occurred had Arkansas personal income growth matched the United States percentage change. This difference, \$2,163 million, is divided into two components: (1) differential-composition (\$1,037 million) in column eight and (2) sector-competitive (\$856 million) in column nine. These results indicate that Arkansas' aggregate industry mix was a positive component of growth as evidenced by the net positive differential-compositional effect (\$1,037 million). Additionally, the positive sector-competitive effect (\$856 million) indicates that, in the aggregate, sectors in Arkansas grew at a faster rate than the corresponding United States sectors.

The comparison of the Southeast Region and Arkansas (see Table 3) yields a picture similar to the United States versus Arkansas comparison. The Arkansas personal income increase of \$4,161 million is composed of: (1) overall-growth (\$2,343 million), (2) positive differential-composition factor (\$1,006 million), and (3) positive sector-competitive (\$812 million). The fact (as was the case in Table 2) that all three shift-share components are positive indicates that Arkansas' personal income growth is stronger than the Southeast Region. Arkansas' growth is supported by a combination of both fast-growth and strong competition sectors.

Table 4 provides information on the comparison of the United States and the Southeast Region. The total growth in Southeast Region personal income (\$71,379 million) is composed of the three components: (1) overall growth (\$60,872 million), (2) a positive differential-compositional factor (\$22,074 million), and (3) a negative sector-competitive factor (-\$11,568 million). The positive differential-compositional factor suggests a combination of sectors that can be, in the aggregate, considered fast-growth. However, the negative sector-competitive factor indicates that many of the Southeast Region sectors are not providing personal income growth equivalent to that of the United States.

Sector Analysis

The sector analysis discussion will use information from Tables 5 and 6. Tables 5 and 6 are based on Tables 2 and 3 which contain the detailed results of our shift-share computations. Table 5 presents the breakdown of personal income percentage contribution by sector for the U.S., Southeast Region, and Arkansas from 2007 to 2009, using preliminary 2009 data. Table 6 reports selected results of the differential-compositional and sector-competitive components using comparisons of Arkansas with both the Southeast Region and the United States.

Table 5 shows eight sectors that provide almost 80 (79.49) percent of Arkansas' 2009 personal income:

- Transfer Receipts (23.52 %)
- Dividends, Interest, and Rents (17.77 %)
- Government (13.46 %)
- Healthcare and Social Assistance (7.76 %)
- Durable Goods Manufacturing (4.57 %)
- Retail Trade (4.33 %)
- Nondurable Goods Manufacturing (4.33 %)
- Construction (3.66 %)

In addition, three of these eight sectors (Transfer Receipts, Government, and Healthcare) had increasing percentages of personal income.

Table 2
United States versus Arkansas Personal Income Shift-Shares, 2007-2009
 (proportion increase for columns 5 and 6) (millions of current dollars for columns 1 - 4 and 7 - 10)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
	US 2007	US 2009	AR 2007	AR 2009	US %	AR %	Growth	Composition	Competitive	Totals
Farm earnings	67,860	67,144	1,927	1,512	0.9894	0.7844	43	-63	-395	-415
Forestry, fishing, related activities	24,647	24,388	498	474	0.9895	0.9518	11	-16	-19	-24
Mining	99,301	124,792	622	873	1.2567	1.4036	14	146	91	251
Utilities	68,899	77,577	631	691	1.1260	1.0959	14	65	-19	60
Construction	601,636	477,763	3,711	3,425	0.7941	0.9231	83	-847	479	-285
Durable goods manufacturing	636,791	561,838	5,002	4,285	0.8823	0.8566	112	-700	-128	-717
Nondurables manufacturing	348,398	338,327	4,175	4,060	0.9711	0.9726	93	-214	6	-115
Wholesale trade	476,653	448,372	3,137	3,189	0.9407	1.0167	70	-256	238	52
Retail trade	572,643	525,159	4,224	4,056	0.9171	0.9602	94	-445	182	-168
Transportation and warehousing	302,341	290,149	3,525	3,183	0.9597	0.9030	79	-221	-200	-342
Information	301,573	299,274	2,248	1,905	0.9924	0.8472	50	-67	-326	-343
Finance and insurance	682,722	607,660	2,389	2,420	0.8901	1.0133	53	-316	294	32
Real estate and rental and leasing	161,386	151,949	775	792	0.9415	1.0207	17	-63	61	16
Prof. and tech. services	847,467	886,892	3,032	3,131	1.0465	1.0326	68	73	-42	99
Mgt. of companies/enterprises	217,529	206,198	2,203	2,639	0.9479	1.1982	49	-164	551	437
Admin. and waste services	351,418	323,168	1,707	1,738	0.9196	1.0178	38	-175	168	30
Educational services	126,680	141,701	401	456	1.1186	1.1364	9	39	7	55
Health care and social assistance	872,607	970,512	6,638	7,272	1.1122	1.0954	148	597	-111	633
Arts, entertainment, and recreation	100,308	98,495	292	299	0.9819	1.0238	7	-12	12	7
Accommodation and food services	274,157	260,498	1,563	1,580	0.9502	1.0108	35	-113	95	17
Other services, exc public admin	329,413	320,063	2,332	2,262	0.9716	0.9701	52	-118	-4	-70
Govt and government enterprises	1,475,367	1,606,569	11,455	12,611	1.0889	1.1009	256	763	137	1,156
plus: Adjustment for residence	537	845	-366	-326	1.5736	0.8895	-8	-202	251	41
plus: Dividends, interest, and rent	2,199,709	2,192,960	16,492	16,644	0.9969	1.0092	368	-419	202	152
plus: Transfer receipts	1,717,908	2,131,880	18,086	22,035	1.2410	1.2184	404	3,955	-409	3,949
less: Contribs for govt soc insurance	-958,097	-968,699	-7,175	-7,521	1.0111	1.0482	-160	81	-267	-346
Total	11,899,853	12,165,474	89,524	93,685	1.0223	1.0465	1,998	1,307	856	4,161

Table 3
Southeast Region versus Arkansas Personal Income Shift-Shares, 2007-2009
 (proportion increase for columns 5 and 6) (millions of current dollars for columns 1 - 4 and 7 – 10)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
	SE 2007	SE 2009	AR 2007	AR 2009	SE %	AR %	Growth	Composition	Competitive	Totals
Farm earnings	12,290	13,212	1,927	1,512	1.0750	0.7844	50	94	-560	-415
Forestry, fishing, related activities	6,296	6,156	498	474	0.9777	0.9518	13	-24	-13	-24
Mining	15,316	18,872	622	873	1.2321	1.4036	16	128	107	251
Utilities	14,015	15,833	631	691	1.1298	1.0959	17	65	-21	60
Construction	140,883	106,281	3,711	3,425	0.7544	0.9231	97	-1,009	626	-285
Durable goods manufacturing	120,595	106,927	5,002	4,285	0.8867	0.8566	131	-698	-150	-717
Nondurables manufacturing	84,712	80,629	4,175	4,060	0.9518	0.9726	109	-311	87	-115
Wholesale trade	104,868	97,791	3,137	3,189	0.9325	1.0167	82	-294	264	52
Retail trade	138,644	127,245	4,224	4,056	0.9178	0.9602	111	-458	179	-168
Transportation and warehousing	73,974	70,146	3,525	3,183	0.9482	0.9030	92	-275	-160	-342
Information	55,655	54,164	2,248	1,905	0.9732	0.8472	59	-119	-283	-343
Finance and insurance	111,948	105,009	2,389	2,420	0.9380	1.0133	63	-211	180	32
Real estate and rental and leasing	34,625	32,085	775	792	0.9266	1.0207	20	-77	73	16
Prof. and tech. services	165,726	176,316	3,032	3,131	1.0639	1.0326	79	114	-95	99
Mgt. of companies/enterprises	42,882	42,316	2,203	2,639	0.9868	1.1982	58	-87	466	437
Admin. and waste services	86,518	78,728	1,707	1,738	0.9100	1.0178	45	-198	184	30
Educational services	21,878	24,521	401	456	1.1208	1.1364	11	38	6	55
Health care and social assistance	192,264	212,897	6,638	7,272	1.1073	1.0954	174	539	-79	633
Arts, entertainment, and recreation	21,135	20,773	292	299	0.9829	1.0238	8	-13	12	7
Accommodation and food services	65,774	62,678	1,563	1,580	0.9529	1.0108	41	-115	90	17
Other services, exc public admin	76,800	73,873	2,332	2,262	0.9619	0.9701	61	-150	19	-70
Govt and government enterprises	369,671	402,726	11,455	12,611	1.0894	1.1009	300	724	132	1,156
plus: Adjustment for residence	12,377	13,736	-366	-326	1.1097	0.8895	-10	-31	81	41
plus: Dividends, interest, and rent	533,181	527,306	16,492	16,644	0.9890	1.0092	432	-613	333	152
plus: Transfer receipts	438,775	543,967	18,086	22,035	1.2397	1.2184	473	3,863	-387	3,949
less: Contribs for govt soc insurance	-213,719	-215,722	-7,175	-7,521	1.0094	1.0482	-188	121	-279	-346
Total	2,727,083	2,798,462	89,524	93,685	1.0262	1.0465	2,343	1,006	812	4,161

Table 4
United States versus Southeast Region Personal Income Shift-Shares, 2007-2009
 (proportion increase for columns 5 and 6) (millions of current dollars for columns 1 - 4 and 7 – 10)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
	US 2007	US 2009	SE 2007	SE 2009	US %	SE %	Growth	Composition	Competitive	Totals
Farm earnings	67,860	67,144	12,290	13,212	0.9894	1.0750	274	-404	1,052	922
Forestry, fishing, related activities	24,647	24,388	6,296	6,156	0.9895	0.9777	141	-207	-74	-140
Mining	99,301	124,792	15,316	18,872	1.2567	1.2321	342	3,590	-376	3,556
Utilities	68,899	77,577	14,015	15,833	1.1260	1.1298	313	1,452	53	1,819
Construction	601,636	477,763	140,883	106,281	0.7941	0.7544	3,145	-32,152	-5,595	-34,602
Durable goods manufacturing	636,791	561,838	120,595	106,927	0.8823	0.8867	2,692	-16,886	527	-13,668
Nondurables manufacturing	348,398	338,327	84,712	80,629	0.9711	0.9518	1,891	-4,340	-1,635	-4,084
Wholesale trade	476,653	448,372	104,868	97,791	0.9407	0.9325	2,341	-8,563	-855	-7,077
Retail trade	572,643	525,159	138,644	127,245	0.9171	0.9178	3,095	-14,591	97	-11,400
Transportation and warehousing	302,341	290,149	73,974	70,146	0.9597	0.9482	1,651	-4,634	-845	-3,828
Information	301,573	299,274	55,655	54,164	0.9924	0.9732	1,242	-1,667	-1,067	-1,491
Finance and insurance	682,722	607,660	111,948	105,009	0.8901	0.9380	2,499	-14,807	5,369	-6,939
Real estate and rental and leasing	161,386	151,949	34,625	32,085	0.9415	0.9266	773	-2,798	-515	-2,540
Prof. and tech. services	847,467	886,892	165,726	176,316	1.0465	1.0639	3,699	4,011	2,880	10,590
Mgt. of companies/enterprises	217,529	206,198	42,882	42,316	0.9479	0.9868	957	-3,191	1,668	-566
Admin. and waste services	351,418	323,168	86,518	78,728	0.9196	0.9100	1,931	-8,886	-834	-7,789
Educational services	126,680	141,701	21,878	24,521	1.1186	1.1208	488	2,106	49	2,643
Health care and social assistance	872,607	970,512	192,264	212,897	1.1122	1.1073	4,292	17,280	-939	20,632
Arts, entertainment, and recreation	100,308	98,495	21,135	20,773	0.9819	0.9829	472	-854	20	-362
Accommodation and food services	274,157	260,498	65,774	62,678	0.9502	0.9529	1,468	-4,745	181	-3,096
Other services, exc public admin	329,413	320,063	76,800	73,873	0.9716	0.9619	1,714	-3,894	-748	-2,928
Govt and government enterprises	1,475,367	1,606,569	369,671	402,726	1.0889	1.0894	8,252	24,623	181	33,055
plus: Adjustment for residence	537	845	12,377	13,736	1.5736	1.1097	276	6,823	-5,741	1,358
plus: Dividends, interest, and rent	2,199,709	2,192,960	533,181	527,306	0.9969	0.9890	11,901	-13,537	-4,239	-5,875
plus: Transfer receipts	1,717,908	2,131,880	438,775	543,967	1.2410	1.2397	9,794	95,940	-542	105,192
less: Contribs for govt soc insurance	-958,097	-968,699	-213,719	-215,722	1.0111	1.0094	-4,771	2,406	362	-2,003
Total	11,899,853	12,165,474	2,727,083	2,798,462	1.0223	1.0262	60,872	22,074	-11,568	71,379

Table 5
Percentage of Personal Income by Sector

	US		SE		AR	
	2007	2009	2007	2009	2007	2009
Farm earnings	0.57	0.55	0.45	0.47	2.15	1.61
Forestry, fishing, and other	0.21	0.20	0.23	0.22	0.56	0.51
Mining	0.83	1.03	0.56	0.67	0.69	0.93
Utilities	0.58	0.64	0.51	0.57	0.70	0.74
Construction	5.06	3.93	5.17	3.80	4.14	3.66
Durable goods manufacturing	5.35	4.62	4.42	3.82	5.59	4.57
Nondurables manufacturing	2.93	2.78	3.11	2.88	4.66	4.33
Wholesale trade	4.01	3.69	3.85	3.49	3.50	3.40
Retail trade	4.81	4.32	5.08	4.55	4.72	4.33
Transportation and warehousing	2.54	2.39	2.71	2.51	3.94	3.40
Information	2.53	2.46	2.04	1.94	2.51	2.03
Finance and insurance	5.74	4.99	4.11	3.75	2.67	2.58
Real estate and rental/leasing	1.36	1.25	1.27	1.15	0.87	0.84
Professional, and technical, services	7.12	7.29	6.08	6.30	3.39	3.34
Management of companies/enterprises	1.83	1.69	1.57	1.51	2.46	2.82
Administrative and waste services	2.95	2.66	3.17	2.81	1.91	1.85
Educational services	1.06	1.16	0.80	0.88	0.45	0.49
Health care and	7.33	7.98	7.05	7.61	7.42	7.76
Arts, entertainment, and recreation	0.84	0.81	0.77	0.74	0.33	0.32
Accommodation and food services	2.30	2.14	2.41	2.24	1.75	1.69
Other services, except	2.77	2.63	2.82	2.64	2.60	2.41
Government and govt enterprises	12.40	13.21	13.56	14.39	12.80	13.46
plus: Adjustment for residence	0.00	0.01	0.45	0.49	-0.41	-0.35
plus: Dividends, interest, and rent	18.49	18.03	19.55	18.84	18.42	17.77
plus: Transfer receipts	14.44	17.52	16.09	19.44	20.20	23.52
less: Contributions for government social insurance	-8.05	-7.96	-7.84	-7.71	-8.01	-8.03
Total	100	100	100	100	100	100

Table 6
Selected Summary of Results

SECTOR	2009 Arkansas Percentage Contribution to Personal Income	2007-2009 Shift-Share Results (millions of dollars) Differential-Compositional Component		2007-2009 Shift-Share Results (millions of dollars) Sector-Competitive Component	
		Ark. vs. U.S.	Ark. vs. S.E.	Ark. vs. U.S.	Ark. vs. S.E.
Transfer Receipts	23.52	3,955	3,863	-409	-387
Dividends, Interest, Rent	17.77	-419	-613	202	333
Government	13.46	763	724	137	132
Healthcare and Social Assistance	7.76	597	539	-111	-79
Durable Goods Manufacturing	4.57	-700	-698	-128	-150
Retail Trade	4.33	-445	-458	182	179
Nondurable Goods Manufacturing	4.33	-214	-311	6	87
Construction	3.66	-847	-1,009	479	626

The other five sectors (Dividends/Interest/Rent, Durable Goods Manufacturing, Retail Trade, Nondurable Goods Manufacturing, and Construction) have declined in their relative importance in providing personal income for Arkansas. Also, from Table 5, it may be observed that Farm Earnings has declined considerably (21.5%) and mining, although still a small contributor to personal income, reflects a significant percentage increase (40.4 %). Most likely, this increase results primarily from the mining of Fayetteville shale (consistent with Collins and Deck (2006).

Referring to Table 6, we note that the four largest contributing sectors [(1) Transfer Receipts, (2) Dividends, Interest, and Rent, (3) Government, and (4) Healthcare and Social Assistance] account for 62.5% of Arkansas personal income. Three of these sectors [(1) Transfer Receipts, (2) Government, and (3) Healthcare and Social Assistance] have positive differential-compositional components and are thus considered fast-growth sectors. The fourth main sector [Dividends, Interest, and Rent] has a negative differential-compositional components indicating slow-growth. This is consistent with the current economic climate of low interest rates and lower earnings.

Continuing the discussion of these main four sectors, it is noted that two sectors [(1) Dividends, Interest, and Rent, and (2) Government] have positive sector-competitive components (last two columns of Table 6). This indicates that these two sectors are growing faster than the national and regional corresponding sectors. Thus, the Dividends, Rent, and Interest sector, though it is slow-growth and actually declined in the nation and region, remains very helpful in providing Arkansas personal income. The positive sector-competitive component for the government sector which is fast-growth suggests, possibly, that funds from the Emergency Economic Stimulus Act of 2009 have had a positive impact on Arkansas personal income, at least for the short-run.

The other two main sectors [Transfer Receipts and Healthcare and Social Assistance] had negative sector-competitive components. Thus, even though they are fast-growth sectors, in Arkansas those sectors are not increasing at the same rate as the corresponding national and regional sectors. Also, Transfer Receipts are particularly noticeable (Table 5) because the Arkansas 2009 percentage of 23.52% is much higher than the region (19.44%) and the national (17.52%).

Further examination of Table 6 (last two columns) highlights three sectors (Construction, Retail Trade, and Nondurable Goods Manufacturing) that, though considered slow-growth, have a positive sector-competitive component when compared to the nation and the region. Thus, these sectors, though sluggish, are doing better at generating personal income growth than their larger national and regional counterparts.

Conclusion

During the recent recession, the percentage increase in personal income for Arkansas (4.65%) exceeded the Southeast Region (2.62%) and the United States (2.23%). The four main contributing sectors are (1) Transfer Receipts (23.52%), (2) Dividends, Interest, and Rent (17.77%), (3) Government (13.46%), and (4) Healthcare and Social Assistance (7.76%).

Two sectors, Transfer Receipts and Government, both had increasing shares of personal income for all three levels, state, region, and nation. Both of these sectors were also fast-growth and likely reflected government stimulus efforts such as extended unemployment benefits and funds from the Emergency Economic Stimulus Act of 2009.

Finally, in four sectors in Arkansas, (1) Dividends, Interest, and Rent, (2) Retail Trade, (3) Nondurable Goods Manufacturing, and (4) Construction, stand out as contributors to personal income. Even though these are slow-growth sectors, they performed well for Arkansas and had positive sector-competitive components when compared to both the United States and Southeast Region. Of particular note, in the nation and the region, the Dividend, Interest, and Rent sector had a decline in total dollars whereas in Arkansas this sector had a small, but positive, dollar increase from 2007 to 2009.

Overall, the Arkansas economy, though not recession-proof, has weathered the 2007-2009 period much better than most states. This outcome is reflective of a reasonably-balanced group of personal income sectors that does not have a highly significant dependence on one sector such as tourism or manufacturing.

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