

Transportation Employment as a Source of Regional Economic Growth: A Shift-Share Approach

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ABSTRACT

The U.S. economy is experiencing major structural and regional adjustments as it develops into an information-oriented society. Traditional (heavy) manufacturing is threatened by overseas competition while young high technology and service industries are burgeoning. In addition, a major shift in population and employment is observed from Old North to Old South and to the West. Such economic and societal transformations can be expected to affect significantly the transportation economy. By means of a shift-share analysis, the changing size and distribution of transportation employment between 1969 and 1982 is documented. The Northeast and Midwest are losing competitive share in all two-digit standard industrial classification (SIC) transportation categories except transportation services. In this paper background is provided for regional theorists interested in regional configurations, transportation planners, and economic development specialists determined to capitalize on comparative advantages of their respective states and localities. The aim is to document, rather than explain, regional shifts in transportation employment.

The quest to determine relationships between transportation, investments, and economic activity has proven to be more complicated and intractable than originally conceived. Location theorists have demonstrated that transportation in the abstract is a major determinant in location decisions and urban or regional form (1,2). However, the impacts of investments in many basic forms of public works are indirect, subtle, and possibly variable over the growth stages of an urban or regional economy.

Attempts to demonstrate these relationships focus on one or the other side of the "chicken and egg" problem: Transportation investments affect economic growth, while economic activity spurs transportation development. Even if a complex model of simultaneous equations were built, findings would probably be inconclusive because of uncontrollable variables. Furthermore, the marginal productivity of infrastructure investment over the life cycle of regional economies is seldom considered. Research findings do suggest that in the early stages a highway network exhibits developmental stimulus, while in later stages it acts more as an agent of personal mobility (3,4).

In this paper a different approach is taken to the transportation-economy question by examining shift in the size and location of the transportation sector of the economy. The U.S. economy is at an advanced stage of sophistication in the sense that the transportation infrastructure and related economic institutions are well established. The distribution and spatial and temporal changes of transpor-

tation employment are of considerable interest to state and local economic development and transportation planning officials.

The purpose of this paper is to document regional shifts in transportation employment that result from, or possibly stimulate, regional shifts in U.S. economic activity, especially from North to South and West. The paper is only indirectly concerned with transportation investments as a measure of industry economic activity. Focus is on general economic activity in transportation that is driven, inter alia, by regional economic vitality and the availability of prior and ongoing infrastructure investments.

From a theoretical viewpoint, this study adds to documentation of major regional and axial shifts now occurring in the U.S. spatial economy. For infrastructure planners and economic development specialists, it provides information on regions and states that are winning and losing in the transportation sector and where opportunities for growth in transportation employment might lie.

BACKGROUND

Approaches

Approaches to the study of transportation and economy have focused largely at the macro- or microlevels. Studies at the mesolevel such as that presented in this paper are in shorter supply.

At the macrolevel, cost of transportation considerations have been central to the formulation of location theories (1) and urban spatial structure models (2). Alongside this theory-building, numerous empirical studies explored transportation as a derived demand, dependent on economic activities, or as a determinant of new production possibilities and demographic change. Using multivariate statistical techniques, some generalizations for highway networks include the following:

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1. In the early stage of the development of a regional economy the highway network is insufficient to stimulate development,

2. In the second stage it is an agent for physical development, and

3. In the third state it shifts to becoming a mobility asset (3,4). Known as the "saturation shift theory," (5) these findings feature transportation as a shifting stimulus to economic activity over regional economic growth stages. Shifts are also observable in terms of the location and distribution of transportation employment in mature economies as discussed later.

At the microlevel much is known about the relationships between new transportation investment and economic development. Indirect local economic and developmental impacts of transit investment, for example, can be characterized and operationalized in computer impact models (5).

It is at the mesolevel that economy and transportation studies appear to be less abundant. Wheat pointed out in 1969 that little was known about whether superior transportation significantly influences manufacturing growth in small to mid-sized urban areas. Apart from his work in the early 1970s, little is known about a topic that has potentially far-reaching implications for highway and airport investment strategies to enhance economic development. The quest to position regions, states, and localities for economic opportunities and growth generates a need for semiaggregated or segmented data. This paper adds to this body of literature by segmenting growth in transportation employment sub-categories for the United States using shift-share analysis.

Regional and Axial Shifts in the U.S. Spatial Economy

The Northeast and Midwest are losing out to growth in the Southeast, South, Southwest, and West. This is evidenced by population movements, as well as shifts in industrial location and employment. The Northeast always has been a net out-migration region. The sudden change in pace and destination of population movement beginning in the 1970s is significant. Although the West and Southwest show gains in population, dramatic growth appears in the South. This might be interpreted as a direct transfer from the Old North to the Old South (8).

Among the many factors hypothesized as contributing to this regional reorientation is the controversial notion that an axial shift is occurring in transportation movements. Vining et al. point to an obscure proposition that the natural grain of the U.S. landscape is north-south, and that high costs are associated with maintaining the principal east-west axis of the U.S. space economy (8). Given a weakening of conservative values and a liberalizing of institutions in the South after the 1960s, along with such physical improvements as air-conditioned comfort, the South has shown rapid growth since the mid-1960s.

Research Question

The central focus for inquiry is whether regional and axial shifts are having an effect on the spatial pattern of the transportation sector. Particular attention is given to north-south shifts in the share of transportation employment as indicated between the East North Central states of Illinois, Indiana, Michigan, Ohio, and Wisconsin; and the East South

Central, and South Atlantic states (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, and South Carolina). Six of the top ten trucking states are included in this group (9).

DATA

As is commonly the case in shift-share studies, this analysis uses employment data as an indicator of industry economic activity. For an industry such as transportation, in which many of the work elements are nonroutine, and thus dependent on human resources, employment is a sound surrogate measure of general economic activity. County business patterns are used for employment data. The advantages of these data are that data from this source are provided annually allowing selection of appropriate years for comparison, and employment data are available by standard industrial classification (SIC) to two or more digits by state. Disadvantages of these data are that they do not include railroad workers, single employed persons, and government workers (nonfederal) and that some definitions have changed during the past 20 years causing some discontinuities for trendline analysis (10).

The period 1969 through 1982 is used for the analysis because 1969 was characterized by strong economic performance and 1982 was characterized by poor economic performance. In business cycle terms, employment changes were thus computed between peak and valley years, which will tend to give a conservative estimate of growth rates. Data were compiled and analyzed on a year-by-year basis to confirm this conclusion.

Employment growth is compared for the following transportation-related industries:

- Total transportation, communications, and public utilities (SIC 4). See Table 1;
- Local and interurban passenger transit (SIC 41). See Table 2;
- Trucking and warehousing (SIC 42). See Table 3;
- Water transportation (SIC 44). See Table 4;
- Air transportation (SIC 45). See Table 5;
- Pipelines (SIC 46). See Table 6; and
- Transportation services (SIC 47) that include freight forwarding, arranging transportation services (including ticketing, railcar and motor vehicle rentals), weigh station, and regulatory activity. See Table 7.

For Tables 1 through 7, note that the County Business Pattern employment data is based primarily on the number of employees reported on U.S. Treasury Form 941 by single-establishment firms for the mid-March pay period each year. The employment figures do not include most self-employed persons or those employed by state and local governments and railroads. Consequently, figures derived from the course will be less than most other estimates of labor-force size.

METHODOLOGY

Shift-share analysis is an approach for identifying the differences in the rates of growth among two or more regions or states. The shift-share analysis specifies those parts of employment change within an industry that are attributable to (a) national total employment growth, (b) employment growth in the industry under analysis, and (c) a state's growth within a particular industry. The shift-share technique helps answer two basic questions about a par-

TABLE 1 Employment Change in Transportation, Communications, and Public Utilities Between 1969 and 1982 (SIC 41, 42, 44, 45, 46, 47, 48, 49)

Region, Division State	Employment 1969	Employment 1982	Percent Change	National Growth	Employment Industry Mix	Change Related to Competitive/ State Share	Total*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NORTHEAST							
New England	196,740	223,509	13.61	62,662	(13,595)	(22,291)	26,769
Maine	12,838	14,899	16.05	4,089	(887)	(1,141)	2,061
New Hampshire	10,009	14,177	41.64	3,188	(692)	1,672	4,168
Vermont	6,397	7,760	21.31	2,037	(442)	(232)	1,363
Massachusetts	106,569	113,047	6.08	33,942	(7,364)	(20,100)	6,478
Rhode Island	14,383	12,188	(15.26)	4,581	(994)	(5,782)	(2,195)
Connecticut	46,544	61,438	32.00	14,824	(3,216)	3,286	14,894
Middle Atlantic	842,916	822,101	(2.47)	268,469	(58,245)	(231,043)	(20,815)
New York	479,919	416,393	(13.24)	152,854	(33,162)	(183,218)	(63,526)
New Jersey	144,221	186,538	29.34	45,934	(9,966)	6,348	42,317
Pennsylvania	218,776	219,170	0.18	69,680	(15,117)	(54,169)	394
NORTH CENTRAL/MIDWEST							
East North Central	671,992	712,948	6.09	214,029	(46,435)	(126,639)	40,956
Ohio	173,756	183,251	5.46	55,341	(12,007)	(33,840)	9,495
Indiana	75,787	91,530	20.77	24,138	(5,237)	(3,158)	5,743
Illinois	231,183	227,890	(1.42)	73,632	(15,975)	(60,950)	(3,293)
Michigan	127,829	131,064	2.53	40,714	(8,833)	(28,646)	3,235
Wisconsin	63,437	79,213	24.87	20,205	(4,383)	(45)	15,776
West North Central	280,659	354,972	26.48	89,390	(19,394)	4,317	74,313
Minnesota	63,401	84,260	32.90	20,193	(4,381)	5,047	20,859
Iowa	38,352	45,413	18.41	12,215	(2,650)	(2,504)	7,061
Missouri	104,905	121,367	15.69	33,412	(7,249)	(9,701)	16,462
North Dakota	8,148	13,589	66.78	2,595	(563)	3,409	5,441
South Dakota	8,679	11,858	36.63	2,764	(600)	1,014	3,179
Nebraska	23,639	30,408	28.63	7,529	(1,633)	873	6,769
Kansas	33,535	48,077	43.36	10,681	(2,317)	6,178	14,542
SOUTH							
South Atlantic	503,877	728,426	44.56	160,485	(34,818)	98,882	224,549
Delaware	9,290	12,320	32.62	2,959	(642)	713	3,030
Maryland	66,700	74,122	11.13	21,244	(4,609)	(9,211)	7,422
Virginia	73,477	100,167	36.32	23,405	(5,077)	8,362	26,690
West Virginia	28,052	29,078	3.66	8,935	(1,938)	(5,969)	1,026
North Carolina	79,231	117,872	48.77	25,235	(5,475)	18,881	38,641
South Carolina	28,984	40,794	40.75	9,231	(2,003)	4,582	11,812
Georgia	84,901	133,486	57.23	27,041	(5,867)	27,415	48,585
Florida	133,242	220,585	65.55	42,438	(9,207)	54,110	87,343
East South Central	160,827	226,833	41.04	51,223	(11,113)	25,896	66,006
Kentucky	38,590	52,067	34.92	12,291	(2,667)	3,851	13,477
Tennessee	49,477	71,593	44.70	15,754	(3,419)	9,777	22,116
Alabama	49,775	68,783	38.19	15,853	(3,439)	6,595	19,008
Mississippi	22,985	34,390	49.62	7,321	(1,588)	5,673	11,405
West South Central	349,283	592,959	69.76	111,246	(24,135)	156,565	243,676
Arkansas	23,516	33,991	44.54	7,490	(1,625)	4,609	10,475
Louisiana	72,899	122,563	68.13	23,218	(5,037)	31,485	49,664
Oklahoma	48,326	72,427	49.87	15,392	(3,339)	12,048	24,101
Texas	204,542	363,978	77.95	65,147	(14,134)	108,428	159,436
WEST							
Mountain	133,072	249,399	87.42	42,383	(9,195)	83,139	116,327
Montana	10,477	16,231	54.92	3,347	(734)	3,141	5,754
Idaho	10,039	14,713	46.56	3,197	(694)	2,171	4,674
Wyoming	6,473	12,469	92.63	2,062	(447)	4,381	5,996
Colorado	41,272	77,931	88.82	13,145	(2,852)	26,366	36,659
New Mexico	15,047	25,124	66.97	4,792	(1,040)	6,324	10,077
Arizona	23,174	49,465	113.45	7,381	(1,601)	20,511	26,291
Utah	16,447	31,746	93.02	5,238	(1,136)	11,197	15,299
Nevada	10,143	21,720	114.14	3,230	(701)	9,047	11,577
Pacific	534,118	749,412	40.31	170,117	(36,908)	82,085	215,294
Washington	58,492	79,236	35.46	18,629	(4,042)	6,156	20,744
Oregon	39,156	51,815	32.33	12,471	(2,706)	2,893	12,659
California	410,162	573,658	39.86	130,637	(28,342)	61,201	163,496
Alaska	7,449	16,258	118.26	2,373	(515)	6,951	8,809
Hawaii	18,859	28,445	50.83	6,007	(1,303)	4,883	9,586
United States Industry Employment	3,703,344	4,626,875	24.94				
United States Total Employment	56,348,479	74,297,252	31.85				

Source: U.S. Bureau of the Census, U.S. Department of Commerce, Census of County Business Patterns. Washington, D.C.: U.S. Government Printing Office.

*Total is computed by subtracting the 1969 from the 1982 Employment figures. Consequently, total figures may vary slightly from the figures obtained by summing National Growth, Industry Mix and Competitive/State Share.

TABLE 2 Employment Change in Local and Interurban Passenger Transit Between 1969 and 1982 (SIC 41)

Region, Division State	Employment 1969	Employment 1982	Percent Change	National Growth	Industry Mix	Employment Change Related to Competitive/ State Share	Total*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NORTHEAST							
New England	30,305	28,430	(6.19)	9,652	(18,535)	7,007	(1,875)
Maine	1,165	913	(21.63)	371	(712)	89	(252)
New Hampshire	1,044	1,539	47.41	333	(639)	801	495
Vermont	677	580	(14.33)	216	(414)	101	(97)
Massachusetts	18,556	15,119	(18.52)	5,910	(11,349)	2,002	(3,437)
Rhode Island	1,896	1,694	(10.65)	604	(1,160)	354	(202)
Connecticut	6,967	8,585	23.22	2,219	(4,261)	3,660	1,618
Middle Atlantic	135,936	74,500	(45.19)	43,296	(83,138)	(21,593)	(61,436)
New York	89,873	38,922	(56.69)	28,624	(54,966)	(24,609)	(50,951)
New Jersey	16,545	15,318	(7.42)	5,270	(10,119)	3,622	(1,227)
Pennsylvania	29,518	20,260	(31.36)	9,401	(18,053)	(606)	(9,258)
NORTH CENTRAL/MIDWEST							
East North Central	64,854	37,255	(42.56)	20,656	(39,665)	(8,593)	(27,599)
Ohio	13,509	5,560	(58.84)	4,303	(8,262)	(3,989)	(7,949)
Indiana	4,276	3,064	(28.34)	1,362	(2,615)	41	(1,212)
Illinois	29,088	14,779	(49.19)	9,265	(17,790)	(5,783)	(14,309)
Michigan	9,316	4,101	(55.98)	2,967	(5,698)	(2,485)	(5,215)
Wisconsin	8,665	9,751	12.53	2,760	(5,300)	3,625	1,086
West North Central	21,978	19,454	(11.48)	7,000	(13,442)	3,918	(2,524)
Minnesota	8,172	8,101	(0.87)	2,603	(4,998)	2,324	(71)
Iowa	2,382	1,372	(42.40)	759	(1,457)	(312)	(1,010)
Missouri	7,706	5,799	(24.75)	2,454	(4,713)	352	(1,907)
North Dakota	592	-	-	188	(362)	-	-
South Dakota	510	737	44.51	162	(312)	376	227
Nebraska	1,580	1,086	(31.27)	503	(966)	(31)	(494)
Kansas	1,628	2,359	44.90	518	(996)	1,208	731
SOUTH							
South Atlantic	32,404	24,737	(23.66)	10,321	(19,818)	1,831	(7,667)
Delaware	1,004	1,350	34.46	320	(614)	640	346
Maryland	5,972	4,319	(27.68)	1,902	(3,652)	97	(1,653)
Virginia	7,984	4,910	(38.50)	2,543	(4,883)	(743)	(3,074)
West Virginia	1,938	1,158	(40.25)	617	(1,185)	(212)	(780)
North Carolina	4,644	3,264	(29.72)	1,479	(2,840)	(19)	(1,380)
South Carolina	1,240	-	-	394	(757)	-	-
Georgia	3,240	2,425	(25.15)	1,032	(1,982)	135	(815)
Florida	7,622	7,311	(4.08)	2,428	(4,662)	1,923	(311)
East South Central	10,996	7,102	(35.41)	3,502	(6,725)	(671)	(3,894)
Kentucky	3,747	1,475	(60.64)	1,193	(2,292)	(1,174)	(2,272)
Tennessee	4,054	3,049	(24.79)	1,291	(2,479)	183	(1,005)
Alabama	2,339	1,825	(21.98)	745	(1,431)	171	(514)
Mississippi	856	753	(12.03)	273	(524)	148	(103)
West South Central	17,459	15,452	(11.50)	5,561	(10,678)	3,109	(2,007)
Arkansas	1,041	791	(24.02)	332	(637)	55	(250)
Louisiana	4,038	3,686	(8.72)	1,286	(2,469)	831	(352)
Oklahoma	1,304	1,196	(8.28)	415	(798)	274	(108)
Texas	11,076	9,779	(11.71)	3,528	(6,774)	1,949	(1,297)
WEST							
Mountain	8,702	13,845	59.10	2,772	(5,322)	7,694	5,143
Montana	802	1,148	43.14	255	(491)	582	346
Idaho	674	735	9.05	215	(412)	258	61
Wyoming	341	524	53.67	109	(209)	283	183
Colorado	2,181	2,191	0.45	694	(1,333)	649	10
New Mexico	1,749	2,108	20.52	557	(1,069)	872	359
Arizona	1,188	3,773	217.59	378	(727)	2,933	2,585
Utah	1,160	-	-	369	(709)	-	-
Nevada	1,767	3,366	90.49	563	(1,081)	2,117	1,599
Pacific	37,328	34,753	(6.90)	11,889	(22,830)	8,366	(2,575)
Washington	3,569	2,917	(18.27)	1,137	(2,183)	394	(652)
Oregon	2,699	3,440	27.45	860	(1,651)	1,532	741
California	29,450	24,577	(16.55)	9,380	(18,012)	3,759	(4,873)
Alaska	517	-	-	165	(316)	-	-
Hawaii	1,610	3,819	137.20	513	(985)	2,681	2,209
United States Industry Employment	367,664	259,889	(29.31)				
United States Total Employment	56,348,479	74,297,252	31.85				

Source: U.S. Bureau of the Census, U.S. Department of Commerce, Census of County Business Patterns. Washington, D.C.: U.S. Government Printing Office.

*Total is computed by subtracting the 1969 from the 1982 Employment figures. Consequently, total figures may vary slightly from the figures obtained by summing National Growth, Industry Mix and Competitive/State Share.

TABLE 3 Employment Change in Trucking and Warehousing Between 1969 and 1982 (SIC 42)

Region, Division State	Employment 1969	Employment 1982	Percent Change	Employment Change Related to			
				National Growth	Industry Mix	Competitive/ State Share	Total*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NORTHEAST							
New England	54,502	50,354	(7.61)	17,359	(9,282)	(12,225)	(4,148)
Maine	4,018	4,098	1.99	1,280	(684)	(516)	80
New Hampshire	2,857	4,102	43.58	910	(487)	822	1,245
Vermont	2,134	2,144	0.47	680	(363)	(306)	10
Massachusetts	27,939	25,081	(10.23)	8,899	(4,758)	(6,999)	(2,858)
Rhode Island	4,528	2,633	(41.85)	1,442	(771)	(2,566)	(1,895)
Connecticut	13,026	12,296	(5.60)	4,149	(2,218)	(2,660)	(730)
Middle Atlantic	200,465	179,746	(10.34)	63,848	(34,139)	(50,428)	(20,719)
New York	81,510	61,803	(24.18)	25,961	(13,881)	(31,787)	(19,707)
New Jersey	53,532	54,801	2.37	17,050	(9,116)	(6,665)	1,269
Pennsylvania	65,423	63,142	(3.49)	20,837	(11,142)	(11,977)	(2,281)
NORTH CENTRAL/MIDWEST							
East North Central	232,237	222,020	(4.40)	73,967	(39,550)	(44,635)	(10,217)
Ohio	66,243	62,981	(4.92)	21,098	(11,281)	(13,079)	(3,262)
Indiana	29,207	32,001	9.57	9,302	(4,974)	(1,534)	2,794
Illinois	75,199	65,760	(12.55)	23,951	(12,806)	(20,583)	(9,439)
Michigan	40,296	34,802	(13.63)	12,834	(6,862)	(11,466)	(5,494)
Wisconsin	21,292	26,476	24.35	6,782	(3,626)	2,029	5184
West North Central	90,646	114,923	26.78	28,871	(15,437)	10,841	24,277
Minnesota	18,925	23,922	26.40	6,028	(3,223)	2,192	4,997
Iowa	14,267	17,036	19.41	4,544	(2,430)	655	2,769
Missouri	33,856	36,062	6.53	10,781	(5,765)	(2,805)	2,212
North Dakota	2,004	4,536	126.35	638	(341)	2,235	2,532
South Dakota	2,828	5,032	77.93	901	(482)	1,784	2,204
Nebraska	7,738	11,587	49.74	2,465	(1,318)	2,702	3,849
Kansas	10,934	16,748	53.17	3,482	(1,862)	4,194	5,814
SOUTH							
South Atlantic	151,540	180,182	18.90	48,265	(25,807)	6,184	28,642
Delaware	2,986	2,340	(21.63)	951	(509)	(1,088)	(646)
Maryland	18,789	20,176	7.38	5,984	(3,200)	(1,398)	1,387
Virginia	21,800	25,624	17.54	6,943	(3,713)	593	3,824
West Virginia	7,058	7,831	10.95	2,248	(1,202)	(273)	773
North Carolina	34,585	41,239	19.24	11,015	(5,890)	1,529	6,654
South Carolina	9,532	12,341	29.47	3,036	(1,623)	1,396	2,809
Georgia	27,657	32,654	18.07	8,809	(4,710)	899	4,997
Florida	29,133	37,977	30.36	9,279	(4,961)	4,527	8,844
East South Central	54,893	75,433	37.42	17,483	(9,348)	12,405	20,540
Kentucky	11,942	16,009	34.06	3,804	(2,034)	2,298	4,067
Tennessee	22,195	30,846	38.98	7,069	(3,780)	5,362	8,651
Alabama	14,685	19,379	31.97	4,677	(2,501)	2,518	4,695
Mississippi	6,071	9,919	63.38	1,934	(1,034)	2,948	3,848
West South Central	98,672	153,958	56.03	31,427	(16,804)	40,663	55,286
Arkansas	8,520	11,935	40.08	2,714	(1,451)	2,152	3,415
Louisiana	14,761	21,681	46.88	4,701	(2,514)	4,732	6,920
Oklahoma	14,342	24,081	67.91	4,568	(2,442)	7,614	9,739
Texas	61,049	96,261	57.68	19,444	(10,397)	26,165	35,212
WEST							
Mountain	36,823	61,601	67.29	11,728	(6,271)	19,321	24,778
Montana	2,974	5,104	71.62	947	(506)	1,689	2,130
Idaho	3,268	5,027	53.82	1,041	(557)	1,274	1,759
Wyoming	2,264	4,456	96.82	721	(386)	1,856	2,192
Colorado	12,398	16,624	34.09	3,949	(2,111)	2,389	4,226
New Mexico	3,440	5,431	57.88	1,096	(586)	1,481	1,991
Arizona	5,244	10,845	106.81	1,670	(893)	4,824	5,601
Utah	5,763	11,038	91.53	1,836	(981)	4,421	5,275
Nevada	1,472	3,076	108.97	469	(251)	1,386	1,604
Pacific	120,117	153,584	27.86	38,257	(20,456)	15,666	33,467
Washington	14,453	20,403	41.17	4,603	(2,461)	3,808	5,950
Oregon	12,774	15,664	22.62	4,068	(2,175)	997	2,890
California	89,111	112,286	26.01	28,382	(15,176)	9,969	23,175
Alaska	864	2,192	153.70	275	(147)	1,200	1,328
Hawaii	2,915	3,039	4.25	928	(496)	(308)	124
United States							
Industry Employment	1,039,380	1,193,397	14.82				
United States							
Total Employment	56,348,479	74,297,252	31.85				

Source: U.S. Bureau of the Census, U.S. Department of Commerce, Census of County Business Patterns. Washington, D.C.: U.S. Government Printing Office.

*Total is computed by subtracting the 1969 from the 1982 Employment figures. Consequently, total figures may vary slightly from the figures obtained by summing National Growth, Industry Mix and Competitive/State Share.

TABLE 4 Employment Change in Water Transportation Between 1969 and 1982 (SIC 44)

Region, Division State	Employment 1969	Employment 1982	Percent Change	Employment Change Related to			Total*
(1)	(2)	(3)	(4)	National Growth	Industry Mix	Competitive/ State Share	(8)
				(5)	(6)	(7)	
NORTHEAST							
New England	2,266	4,240	87.11	722	(88)	1,341	1,974
Maine	274	684	149.64	87	(11)	333	410
New Hampshire	95	164	72.63	30	(4)	42	69
Vermont	-	83	-	-	-	-	-
Massachusetts	1,284	2,650	106.39	409	(50)	1,007	1,366
Rhode Island	613	576	(6.04)	195	(24)	(208)	(37)
Connecticut	724	-	-	236	(28)	-	-
Middle Atlantic	46,452	37,544	(19.18)	14,795	(1,812)	(21,891)	(8,908)
New York	30,149	19,671	(34.75)	9,602	(1,176)	(18,905)	(10,478)
New Jersey	7,489	10,635	42.01	2,385	(292)	1,053	3,146
Pennsylvania	8,814	7,238	(17.88)	2,807	(344)	(4,040)	(1,576)
NORTH CENTRAL/MIDWEST							
East North Central	8,590	7,830	(8.85)	2,736	(335)	(3,161)	(760)
Ohio	4,144	2,916	(29.63)	1,320	(162)	(2,386)	(1,228)
Indiana	699	856	22.46	223	(27)	(38)	157
Illinois	2,584	3,204	(23.99)	823	(101)	(102)	620
Michigan	1,163	754	(35.17)	370	(45)	(734)	(409)
Wisconsin	-	-	-	-	-	-	-
West North Central	2,394	5,193	116.92	762	(93)	2,130	2,799
Minnesota	403	5,886	45.41	128	(16)	70	183
Iowa	53	-	-	17	(2)	-	-
Missouri	1,991	4,607	131.99	634	(78)	2,060	2,616
North Dakota	-	-	-	-	-	-	-
South Dakota	-	-	-	-	-	-	-
Nebraska	-	9	-	-	-	-	-
Kansas	-	126	-	-	-	-	-
SOUTH							
South Atlantic	25,007	31,323	25.26	7,965	(975)	(673)	6,316
Delaware	489	2,483	407.77	156	(19)	1,857	1,994
Maryland	8,421	6,071	(27.91)	2,682	(328)	(4,704)	(2,350)
Virginia	5,302	4,584	13.54	1,689	(207)	(2,200)	(718)
West Virginia	566	585	3.36	180	(22)	(139)	19
North Carolina	2,602	-	-	829	(101)	-	-
South Carolina	1,325	1,950	47.17	422	(52)	255	625
Georgia	1,044	1,935	87.07	333	(41)	617	909
Florida	7,860	13,697	74.26	2,503	(307)	3,640	5,837
East South Central	8,438	11,301	33.93	2,688	(329)	505	2,863
Kentucky	1,114	2,034	82.59	355	(43)	309	920
Tennessee	852	1,215	42.61	271	(33)	125	363
Alabama	4,463	5,163	15.68	1,421	(174)	(548)	700
Mississippi	2,009	2,880	43.35	640	(78)	309	871
West South Central	27,092	66,551	145.65	8,629	(1,057)	31,887	39,459
Arkansas	123	-	-	39	(5)	-	-
Louisiana	18,536	42,037	126.79	5,904	(723)	18,321	23,501
Oklahoma	77	244	216.88	25	(3)	145	167
Texas	8,479	24,270	186.24	2,701	(331)	13,421	15,791
WEST							
Mountain	-	-	-	-	-	-	-
Montana	-	-	-	-	-	-	-
Idaho	-	-	-	-	-	-	-
Wyoming	-	-	-	-	-	-	-
Colorado	-	20	-	-	-	-	-
New Mexico	-	18	-	-	-	-	-
Arizona	-	-	-	-	-	-	-
Utah	-	130	-	-	-	-	-
Nevada	-	-	-	-	-	-	-
Pacific	34,476	35,600	3.26	10,981	(1,345)	(8,512)	1,124
Washington	7,772	7,905	1.71	2,475	(303)	(2,039)	133
Oregon	3,679	3,783	2.83	1,172	(143)	(924)	104
California	22,014	22,775	3.46	7,011	(858)	(5,391)	761
Alaska	1,011	1,137	12.46	322	(39)	(159)	126
Hawaii	1,701	-	-	542	(66)	-	-
United States Industry Employment	160,906	205,878	27.95				
United States Total Employment	56,348,479	74,297,252	31.85				

Source: U.S. Bureau of the Census, U.S. Department of Commerce, Census of County Business Patterns. Washington, D.C.: U.S. Government Printing Office.

*Total is computed by subtracting the 1969 from the 1982 Employment figures. Consequently, total figures may vary slightly from the figures obtained by summing National Growth, Industry Mix and Competitive/State Share.

TABLE 5 Employment Change in Transportation by Air Between 1969 and 1982 (SIC 45)

Region, Division State	Employment 1969	Employment 1982	Percent Change	Employment Change National Growth	Employment Change Industry Mix	Employment Change Related to Competitive/ State Share	to Total*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NORTHEAST							
New England	9,076	11,858	30.65	2,891	(540)	431	2,782
Maine	164	616	275.61	52	(10)	-410	452
New Hampshire	128	-	-	41	(8)	-	-
Vermont	-	515	-	-	-	-	-
Massachusetts	8,095	9,125	13.84	2,578	(482)	(977)	1,120
Rhode Island	-	-	-	-	-	-	-
Connecticut	817	1,602	96.08	260	(49)	573	785
Middle Atlantic	71,402	71,408	0.008	22,742	(4,248)	(18,487)	6
New York	56,390	49,257	(12.65)	17,960	(3,355)	(21,738)	(7,133)
New Jersey	6,343	9,631	51.84	2,020	(377)	1,645	3,288
Pennsylvania	8,669	12,520	44.42	2,761	516	1,606	3,851
NORTH CENTRAL/MIDWEST							
East North Central	38,296	42,648	11.36	12,197	(2,279)	(5,567)	4,352
Ohio	4,920	6,588	33.90	1,567	(293)	394	1,668
Indiana	1,971	2,188	11.01	628	(117)	(293)	217
Illinois	24,043	25,520	6.14	7,658	(1,431)	(4,751)	1,477
Michigan	5,876	6,200	5.51	1,872	(350)	(1,198)	324
Wisconsin	1,486	2,152	44.82	473	(88)	281	666
West North Central	26,417	28,378	7.42	8,414	(1,572)	(4,881)	1,961
Minnesota	7,036	9,336	32.69	2,241	(418)	478	2,300
Iowa	741	755	1.89	236	(44)	(178)	14
Missouri	16,321	14,811	(9.25)	5,190	(971)	(5,737)	(1,510)
North Dakota	178	276	55.06	57	(11)	52	98
South Dakota	287	236	(17.77)	91	(17)	(125)	(51)
Nebraska	736	729	(0.95)	234	(44)	(198)	(7)
Kansas	1,118	2,235	99.91	356	(67)	827	1,117
SOUTH							
South Atlantic	60,481	90,909	50.31	19,263	(3,599)	14,763	30,428
Delaware	802	-	-	255	(48)	-	-
Maryland	1,419	1,907	34.39	452	(84)	120	488
Virginia	6,985	9,857	41.12	2,225	(416)	1,063	2,872
West Virginia	175	595	240.00	56	(10)	375	420
North Carolina	3,720	6,509	74.97	1,185	(221)	1,825	2,789
South Carolina	754	1,218	61.54	240	(45)	269	464
Georgia	14,389	28,132	95.51	4,583	(856)	10,016	13,743
Florida	33,093	42,691	29.00	10,540	(1,969)	1,026	9,598
East South Central	9,251	14,634	58.19	2,946	(550)	2,987	5,383
Kentucky	1,258	2,077	65.10	401	(75)	493	819
Tennessee	3,028	8,824	191.45	964	(180)	5,013	5,797
Alabama	4,584	3,096	(32.46)	1,460	(273)	(2,675)	(1,488)
Mississippi	381	637	67.19	121	(23)	157	256
West South Central	30,383	48,512	59.67	9,677	(1,808)	10,260	18,129
Arkansas	339	1,059	212.39	1,088	(20)	632	720
Louisiana	2,976	8,031	169.86	948	(177)	4,284	5,055
Oklahoma	8665	3,714	(57.14)	2,760	(516)	(7,195)	(4,951)
Texas	18,403	35,708	94.03	5,861	(1,095)	12,538	17,305
WEST							
Mountain	13,637	27,027	98.19	4,343	(811)	9,858	13,390
Montana	398	697	75.13	127	(24)	196	299
Idaho	329	548	66.57	105	(20)	134	219
Wyoming	209	470	124.88	67	(12)	206	261
Colorado	6,933	14,903	114.96	2,208	(413)	6,175	7,970
New Mexico	866	818	(5.54)	276	(52)	(272)	(48)
Arizona	2,781	4,982	79.14	886	(165)	1,481	2,201
Utah	1,073	2,291	113.51	342	(64)	940	1,218
Nevada	1048	2,318	121.18	334	(62)	999	1,270
Pacific	79,175	91,251	15.25	25,217	(4,711)	(6,430)	12,076
Washington	7,124	8,684	21.90	2,269	(424)	(285)	1,560
Oregon	1,467	1,964	33.88	467	(87)	117	497
California	63,275	68,595	8.41	20,153	(3,765)	(11,068)	5,320
Alaska	2,656	5,655	112.91	846	(158)	2,311	2,999
Hawaii	4,653	6,353	36.90	1,482	(277)	512	1,700
United States Industry Employment	340,793	429,071	25.90				
United States Total Employment	56,348,479	74,297,252	31.85				

Source: U.S. Bureau of the Census, U.S. Department of Commerce, Census of County Business Patterns. Washington, D.C.: U.S. Government Printing Office.

*Total is computed by subtracting the 1969 from the 1982 Employment figures. Consequently, total figures may vary slightly from the figures obtained by summing National Growth, Industry Mix and Competitive/State Share.

TABLE 6 Employment Change in Pipelines Except Natural Gas Between 1969 and 1982 (SIC 46)

Region, Division State	Employment 1969	Employment 1982	Percent Change	Employment Change Related to			Total*
				National Growth	Industry Mix	Competitive/ State Share	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NORTHEAST							
New England	-	-	-	-	-	-	-
Maine	-	-	-	-	-	-	-
New Hampshire	-	-	-	-	-	-	-
Vermont	-	-	-	-	-	-	-
Massachusetts	-	-	-	-	-	-	-
Rhode Island	-	-	-	-	-	-	-
Connecticut	-	-	-	-	-	-	-
Middle Atlantic	1,101	1,204	9.36	351	(132)	(115)	103
New York	174	146	(16.09)	55	(21)	(62)	(28)
New Jersey	127	212	66.93	40	(15)	60	85
Pennsylvania	800	846	5.75	255	(96)	(113)	46
NORTH CENTRAL/MIDWEST							
East North Central	1,637	2,073	88.28	351	(132)	754	972
Ohio	570	956	67.72	182	(69)	273	386
Indiana	135	165	22.22	43	(16)	3	30
Illinois	766	824	7.57	244	(92)	(94)	58
Michigan	166	128	(22.89)	53	(20)	(71)	(38)
Wisconsin	-	-	-	-	-	-	-
West North Central	1,352	1,234	(8.73)	431	(163)	(386)	(118)
Minnesota	-	-	-	-	-	-	-
Iowa	174	-	-	55	(21)	-	-
Missouri	259	187	(27.80)	82	(31)	(123)	(72)
North Dakota	-	-	-	-	-	-	-
South Dakota	-	-	-	-	-	-	-
Nebraska	184	-	-	59	(22)	-	-
Kansas	1,093	1,047	(4.21)	348	(131)	(171)	(46)
SOUTH							
South Atlantic	485	343	(29.28)	154	(58)	(238)	(142)
Delaware	-	-	-	-	-	-	-
Maryland	-	-	-	-	-	-	-
Virginia	142	-	-	45	(17)	-	-
West Virginia	137	-	-	44	(16)	-	-
North Carolina	114	-	-	36	(13)	-	-
South Carolina	-	-	-	-	-	-	-
Georgia	485	343	(29.28)	154	(58)	(238)	(142)
Florida	-	50	-	-	-	-	-
East South Central	322	327	1.51	103	(39)	(59)	5
Kentucky	166	171	3.01	53	(20)	(28)	5
Tennessee	-	50	-	-	-	-	-
Alabama	-	65	-	-	-	-	-
Mississippi	156	156	0.00	50	(19)	(31)	0
West South Central	5,347	5,322	(0.47)	1,703	(643)	(1,085)	(25)
Arkansas	-	-	-	-	-	-	-
Louisiana	812	801	(1.35)	259	(98)	(172)	(11)
Oklahoma	1,980	-	-	631	(238)	-	-
Texas	4,535	4,521	(0.30)	1,444	(546)	(912)	(14)
WEST							
Mountain	690	420	(39.13)	220	(83)	(407)	(270)
Montana	133	43	(67.67)	42	(16)	(116)	(90)
Idaho	-	-	-	-	-	-	-
Wyoming	322	227	(29.50)	103	(39)	(159)	(95)
Colorado	-	966	-	-	-	-	-
New Mexico	235	150	(36.17)	75	(28)	(132)	(85)
Arizona	-	-	-	-	-	-	-
Utah	-	-	-	-	-	-	-
Nevada	-	-	-	-	-	-	-
Pacific	782	1,812	131.71	249	(94)	875	1,030
Washington	-	-	-	-	-	-	-
Oregon	-	-	-	-	-	-	-
California	782	1,812	131.71	249	(94)	875	1,030
Alaska	-	-	-	-	-	-	-
Hawaii	-	-	-	-	-	-	-
United States Industry Employment	15,522	18,599	19.82				
United States Total Employment	56,348,479	74,297,252	31.85				

Source: U.S. Bureau of the Census, U.S. Department of Commerce, Census of County Business Patterns. Washington, D.C.: U.S. Government Printing Office.

*Total is computed by subtracting the 1969 from the 1982 Employment figures. Consequently, total figures may vary slightly from the figures obtained by summing National Growth, Industry Mix and Competitive/State Share.

TABLE 7 Employment Change in Transportation Services Between 1969 and 1982 (SIC 47)

Region, Division State	Employment 1969	Employment 1982	Percent Change	Employment Change Related to			
(1)	(2)	(3)	(4)	National Growth	Industry Mix	Competitive/ State Share	Total*
				(5)	(6)	(7)	(8)
NORTHEAST							
New England	4,329	11,428	163.99	1,379	3,887	1,833	7,099
Maine	-	346	-	-	-	-	-
New Hampshire	-	487	-	-	-	-	-
Vermont	109	344	215.60	35	98	102	235
Massachusetts	3,018	6,442	113.45	961	2,710	(247)	3,424
Rhode Island	276	571	106.88	88	248	(41)	295
Connecticut	926	4,071	339.63	295	831	2,019	3,145
Middle Atlantic	36,869	51,778	40.44	11,743	33,105	(29,938)	14,909
New York	29,043	35,436	22.01	9,250	26,078	(28,936)	6,393
New Jersey	3,291	8,395	155.09	1,048	2,955	1,101	5,104
Pennsylvania	4,535	7,947	75.24	1,444	4,072	(2,104)	3,412
NORTH CENTRAL/MIDWEST							
East North Central	13,493	30,483	125.92	4,298	12,115	577	16,990
Ohio	2,289	5,795	153.17	729	2,035	722	3,506
Indiana	644	2,129	230.59	205	578	702	1,485
Illinois	7,000	14,637	109.10	2,230	6,285	(878)	7,637
Michigan	2,809	5,327	89.64	895	2,522	(899)	2,518
Wisconsin	751	2,595	245.54	239	674	930	1,844
West North Central	4,919	10,388	111.18	1,567	4,417	(514)	5,469
Minnesota	1,226	3,390	76.51	390	1,101	673	2,164
Iowa	447	1,097	145.41	142	401	106	650
Missouri	2,616	3,979	52.10	833	2,349	(1,819)	1,363
North Dakota	135	283	109.63	43	121	(16)	148
South Dakota	101	256	153.47	32	91	32	155
Nebraska	900	-	-	287	808	-	-
Kansas	394	1,383	251.02	125	354	510	989
SOUTH							
South Atlantic	11,869	30,621	157.99	3,780	10,657	4,314	18,752
Delaware	-	585	-	-	-	-	-
Maryland	1,556	3,667	135.67	496	1,397	218	2,111
Virginia	873	3,376	286.71	278	784	1,441	2,503
West Virginia	143	-	-	46	128	-	-
North Carolina	977	2,470	152.81	311	877	305	1,493
South Carolina	360	1,878	421.67	115	323	1,080	1,518
Georgia	2,836	3,895	37.34	903	2,546	(2,391)	1,059
Florida	5,267	15,335	191.15	1,678	4,729	3,661	10,068
East South Central	2,123	5,157	142.91	676	1,907	452	3,034
Kentucky	443	1,191	168.85	141	398	209	748
Tennessee	647	2,152	232.61	206	581	718	1,505
Alabama	901	1,368	51.83	287	809	(629)	467
Mississippi	132	446	237.88	42	119	153	314
West South Central	7,186	25,588	256.08	2,289	6,452	9,661	18,402
Arkansas	146	650	345.21	47	131	326	504
Louisiana	2,415	4,657	92.84	769	2,168	(696)	2,242
Oklahoma	474	1,179	148.73	151	426	128	705
Texas	4,151	19,102	360.18	1,322	3,727	9,902	14,951
WEST							
Mountain	1,458	8,751	500.21	464	1,309	5,519	7,293
Montana	92	404	339.13	29	82	201	312
Idaho	84	504	500.00	27	75	318	420
Wyoming	44	-	-	14	40	-	-
Colorado	600	3,263	443.83	191	539	1,933	2,663
New Mexico	86	513	496.51	27	77	322	427
Arizona	331	2,062	522.96	105	297	1,328	1,731
Utah	198	1,078	444.44	63	178	639	880
Nevada	67	927	1,283.58	21	60	778	860
Pacific	17,687	47,354	167.73	5,633	15,881	8,153	29,667
Washington	1,644	5,403	228.65	524	1,476	1,759	3,759
Oregon	770	2,067	168.44	245	691	360	1,297
California	13,576	35,501	161.50	4,324	12,190	5,411	21,925
Alaska	-	649	-	-	-	-	-
Hawaii	1,697	4,383	158.28	540	1,524	622	2,686
United States Industry Employment	102,117	226,328	121.64				
United States Total Employment	56,348,479	74,297,252	31.85				

Source: U.S. Bureau of the Census, U.S. Department of Commerce, Census of County Business Patterns, Washington, D.C.: U.S. Government Printing Office.

*Total is computed by subtracting the 1969 from the 1982 Employment figures. Consequently, total figures may vary slightly from the figures obtained by summing National Growth, Industry Mix and Competitive/State Share.

ticular industry for a particular region or state. Is the state increasing or decreasing its share of national employment for each industry (shown in each table as Competitive/State Share)? Does the state have an enhancing or impeding industry mix relative to the nation as a whole (shown as Industry Mix)?

In Tables 1-7, Columns 1, 2, and 3 give the raw data for each region and state. Column 4 displays the percentage growth rate in employment. Data for all nine geographic diversions and 50 states are given in each table. National employment data and percentage change for the particular industry (SIC) and for U.S. total employment is provided on the last two rows of each table.

Columns 5 through 8 designate the employment growth according to Items 1, 2, and 3 listed at the beginning of this section. First, changes in overall national employment may be treated as a reflection of business conditions (Column 5). For example, if national employment increases it will, to some extent, contribute to growth in specific industries and regions. The opposite effect would be translated by sluggish or declining national employment.

Employment in an industry may be increasing or decreasing independently from national employment trends and, consequently, may be viewed as a second component affecting employment changes in a region. Column 6 shows the increment in employment above or below that in Column 5 attributable to the national growth rate of the particular SIC. This is known as industry mix. A large negative number in this column, relative to other states, indicates that that state has above average concentration in a national slow-growth industry.

Finally, a region or state may have particular attributes that make it more or less attractive than other areas for a particular industry. Because the areas being compared in this study are primarily the states, this component is called the state share. The state share is a reflection of how competitive a state is in the specific industry being examined. Column 7 shows the increment in employment above or below that in Column 6 attributable to how a particular state's SIC growth rate varies from the national growth rate for that SIC. By comparing the signs and absolute values of the growth components in Columns 6 and 7 it is possible to discern whether growth or decline in a particular region or state is attributable primarily to concentration of the industry or to the economic performance of that industry in the specific region or state.

The methodology also allows for the identification of high-performer regions and states. Two criteria are used to screen for high-performer states: (a) the competitive share (Column 7) must be at least equal to the national growth component (Column 5), that is, growth in competitive share must be comparable with growth resulting from the national economy; and (b) absolute growth in employment (Column 8) must be at least 2 percent of absolute growth for the industry nationally.

RESULTS

Major Employment Trends in Transportation

Table 8 displays the national growth rates for all the SICs under consideration. Except for transportation services (SIC 47), at 121.64 percent, the transportation sector had a slower growth (24.94 percent) than national employment growth (31.85 percent). Local and interurban passenger transit (SIC 41) had a negative growth of -29.31 percent. The remaining industry growth rates ranged from 14.82 percent (trucking and warehousing) to 27.95 percent (water transportation).

TABLE 8 National SIC Growth Rates

Negatives	Change 1969-1982 (%)
All U.S. employment	31.85
SIC 4--Total transportation communications and public utilities	24.94
SIC 41--Local and interurban passenger transit	-29.31
SIC 42--Trucking and warehousing	14.82
SIC 44--Water transportation	27.95
SIC 45--Air transportation	25.95
SIC 46--Pipelines	19.82
SIC 47--Transportation services	121.64

Source: U.S. Bureau of the Census, U.S. Department of Commerce, Census of County Business Patterns, U.S. Government Printing Office.

Growth rates by industry and by geographic region are given in Table 9. For SIC 4 (transportation, communications, and public utilities) growth rates in the Northeast and North Central regions were considerably lower than those in the South and West. In general, this pattern repeats itself for SICs 41, 42, and 45. Some variation can be observed in water transportation (SIC 44) where the growth in New England, West North Central and West South Central was outstanding. For pipelines (SIC 46), very high growth rates in East North Central and Pacific can be observed. However, both these transportation industries are unique to particular subregions of the United States and neither are major employers. SIC 47 (transportation services) also varied from the general pattern in that New England and East North Central displayed growth more nearly comparable with the South and West.

These broad patterns are shown in Table 10. Here growth rates are shown by three indicators: D for absolute decline, I for above industry rate, and 0 for below industry rate. High growth geographic divisions--those with five or more Is--are all found in the South and West.

Shift-Share Discussion by SIC

Because of the unique characteristics of employment in local and interurban passenger transit, water transportation, and pipelines, the following discussion concentrates on SICs 4, 42, 45, and 47 using the shift-share Tables 1, 3, 5, and 7.

The results of the shift-share analysis for SIC 4 appear in Table 1. All states enjoyed some growth in transport-related employment during the study period, with the exceptions of Rhode Island, New York, and Illinois (Column 8). The shift-share analysis shows that growth in the East North Central was due entirely to national growth (all negative figures in Columns 6 and 7). While all states "lost" employment in Column 6 because the transportation sector grew more slowly than total national employment, only in the New England, middle Atlantic and East North Central did most states "lose" employment due to declines in the state share. Moreover, the middle Atlantic and East North Central regions had by far the lowest percentage increase (-2.47 and 6.09 percent, respectively) in transport-related employment. In short, the East North Central states were not competitive with the East South Central, West South Central or South Atlantic states. During the study period growth in transport-related employment resulted in more absolute employment in the South Atlantic states than in the East North Central. Indiana and Wisconsin were the best-performing states within the East North Central states. However, the large majority of states in the South Atlantic, East and West South Central regions ex-

TABLE 9 Growth Rates by Region and SIC^a

	SIC 4	SIC 41	SIC 42	SIC 44	SIC 45	SIC 46	SIC 47
Northeast							
New England	13.61	-6.19	-7.61	87.11	30.65	- ^b	163.99
Middle Atlantic	-2.47	-45.19	-10.34	-19.18	0.01	9.36	40.44
North Central							
East North Central	6.09	-42.56	-4.40	-8.85	11.36	88.28	125.92
West North Central	26.48	-11.48	26.78	116.92	7.42	-8.73	111.18
South							
South Atlantic	44.56	-23.66	18.90	25.26	50.31	-29.28	157.99
East South Central	41.04	-35.41	37.42	33.93	58.19	1.51	142.91
West South Central	69.76	-11.50	56.03	145.65	59.67	-0.47	256.08
West							
Mountain	87.42	59.10	67.29	- ^b	98.19	-39.13	500.21
Pacific	40.31	-6.90	27.86	3.26	15.25	131.71	167.73
Industry nationwide	24.95	-29.31	14.82	27.95	25.90	19.82	121.64
All U.S. employment	31.85	31.85	31.85	31.85	31.85	31.85	31.85

Source: U.S. Bureau of the Census, U.S. Department of Commerce. Census of County Business Patterns. U.S. Government Printing Office.

^aPercentage of change from 1969 to 1982.

^bNo data available.

TABLE 10 Simplified Growth Rates by Region and SIC

	SIC 4	SIC 41	SIC 42	SIC 44	SIC 45	SIC 46	SIC 47
Northeast							
New England	0	1,D	0,D	1	1	- ^a	1
Middle Atlantic	0,D	0,D	0,D	0,D	0	0	0
North Central							
East North Central	0	0,D	0,D	0,D	0	1	1
West North Central	1	1,D	1	1	0	0,D	0
South							
South Atlantic	1	1,D	1	0	1	0,D	1
East South Central	1	0,D	1	1	1	0	1
West South Central	1	1,D	1	1	1	0,D	1
West							
Mountain	1	1	1	- ^a	1	0	1
Pacific	1	1,D	1	0	0	1	1

Note: D = absolute decline, 0 = below industry growth rate, and 1 = above industry rate.

^aNo data available.

perienced growth at almost twice the rate experienced in Indiana and Wisconsin.

Of all transportation employment categories, local and interurban passenger transit (SIC 41) suffered most between 1969 and 1982 (Table 2). The middle Atlantic and East North Central regions were hit hardest with changes of -45.19 and -42.56 percent, respectively, compared with the national rate of -29.31 percent. Relative to the southern states, the state share (Column 7) is worst for the Northeast and Midwest, indicating loss in competitive position.

This loss in competitive position is repeated for trucking and warehousing (SIC 42) in Table 3. In absolute terms, the East North Central region retains the highest absolute employment. However, with a growth rate of -4.4 percent, major losses occur. This is dramatized by contrasting Michigan's employment decline from 40,000 to 35,000, with North Carolina's gain from 35,000 to 41,000.

In Table 5, air transportation (SIC 45), two East North Central states perform above the national in-

dustry average, but on balance the Midwest loses competitive share to the South and West. Furthermore, in absolute terms, South Atlantic air transportation employment exceeds that for the East North Central; in relative terms the South Atlantic states have performed far beyond the East North Central states.

Finally, Table 7 shows the only bright spot for the Northeast and Midwest. Its transportation services (SIC 47) show a healthy growth rate of +125.92 percent, not far behind the East South Central and the South Atlantic, all performing ahead of the national average of +121.64 percent. Transportation services depend on sophisticated transportation networks, intermodal facilities and good computer and telecommunications systems. The Northeast and Midwest probably retain a strong technological and institutional endowment with their science-based industries, technical labor force, and built communications systems. The South and West would appear to have comparatively less advantage in this area of transportation employment.

In summary, the general pattern of Table 1 tends to persist at all two-digit levels, with some exceptions. That pattern is job loss in all regions due to industry mix, and further loss in the Northeast and Midwest due to state competitive share. Transportation services are the highest growth part of the transport sector. However, the general trend shows a loss in competitive share from North to South and West even though, in absolute terms, employment remains highest for many SICs in the North, because of industrial concentration.

High-Performer States

With the use of the heuristic method described at the end of the Methodology section, Table 11 displays states that are high performers under each SIC. Several Northeast and Midwest states perform well in single SIC categories. However, the bulk of high-performance cases cluster in the South and West, particularly the West South Central and Mountain regions. Most noticeable states repeatedly performing well are Arizona, Colorado, Louisiana, Oklahoma, and Texas.

TABLE 11 High-Performer States

	SIC 4	SIC 42	SIC 45	SIC 47
Connecticut				X
New Jersey				X
Wisconsin				Marginal
Minnesota				Marginal
Virginia				X
North Carolina			X	
Georgia	X		X	
Florida	X			X
Mississippi		X		
Tennessee			X	
Louisiana	X	X	X	
Oklahoma	Marginal			
Texas	X	X	X	X
Colorado	X		X	X
Arizona	X	X	X	Marginal
Utah	Marginal	X		
Washington				X
California				X
Alaska			X	

INTERPRETATION OF RESULTS

These data show that transportation employment has grown slower than the national average for the period 1969 to 1982. All two-digit SIC categories reflect this pattern except transportation services (SIC 47), which grew at +121.64 percent compared with a total national employment growth of +31.85 percent. Even air transportation employment grew slower than U.S. total employment. This may point to structural changes within the transportation industry, where information, coordination, and networking are becoming relatively more important. Such a trend raises economic policy questions such as how can a region or state capitalize on the services growth component of the transportation industry. Superior transportation services are probably closely tied to established institutional arrangements and sophisticated communication and computer systems capability--which again indicates the interrelationship of telecommunications and transportation surfaces. Telecommunications may be more of a complement than a substitute in the transportation growth equation.

The data suggest that regional shifts in the U.S. spatial economy are reflected in the changing distribution of employment in the transportation sector. While the Northeast and Midwest regions combined

still surpass the South and West for transportation employment in absolute terms, growth rates in the latter two regions far exceed the former. This poses a threat to traditional transportation states in the frost belt. For example, Illinois, Indiana, Michigan, and Ohio are among the top 10 trucking states. The growth rate in the East North Central region for trucking and warehousing (SIC 42) was -4.4 percent, whereas directly south of the East South Central it was +37.42 percent. The competitive position of the New England, middle Atlantic, and East North Central in transportation employment is clearly under threat.

While not confirming an axial shift, these data are congruent with the theory. In each of the SICs, the South and West regions are gaining employment at the expense of the Northeast and Midwest. Only in transportation services where comparative advantage may hinge on established institutional networks and on computer and communications systems is employment growth in the Northeast and Midwest comparable with the South. The services component of the transportation industry may be little affected by the natural north-south grain.

However, the outstanding growth states are not in the Old South as axial shift theory would suggest. Rather, they are in the West South Central and Mountain. This suggests a diagonal shift to the new South and near-lower West, especially to such states as Arizona, Colorado, Louisiana, Oklahoma, Texas, and Utah.

CONCLUSION

The shift-share approach is an instructive tool for displaying relationships between transportation and economy. By tracking shares in transportation employment across various transportation SICs, it is possible to segment various attributing factors (national growth, industry mix, and competitive share), and to identify regions or states of competitive gain or loss. Therefore, it adds to a body of meso-level approaches that are currently in demand for strategic analysis by state, regional, and local economic development specialists.

The shift-share approach also confirms some megatrends affecting the U.S. spatial economy, and thus, transportation network futures as well. Regional demographic and employment shifts in the United States appear to be affecting the regional distribution of transportation employment. Between 1969 and 1982, the Northeast and Midwest states lost competitive share to the South and West states. This occurred noticeably in all transportation employment categories except transportation services. The traditional Midwest trucking states for example, although still larger in absolute employment, are losing trucking and warehousing employment to the South.

These regional trends are congruent with an axial shift theory which asserts that the natural north-south grain of the United States may become more important relative to the historical east-west axis. Because the implications for transportation investments, both nationally and regionally, might be significant, this axial shift theory needs more thorough exploration.

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