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EMPLOYMENT PERFORMANCES OF CLEVELAND, PITTSBURGH, AND CINCINNATI, 1950-1966

PART I: COMPARISON WITH THE UNITED STATES

INTRODUCTION

This study is concerned with comparative employment performances during 1950-1966 of Cleveland, Pittsburgh, and Cincinnati, the three major cities in the Fourth Federal Reserve District. Special attention is paid to the strong and weak spots within the patterns of change of the three cities.

The study will be presented in a series of three articles in the *Economic Review*. In the present article, data for the three cities are compared with data for the United States. In the second article, the three cities will be compared with ten other large cities of the East and North Central regions of the United States.[1] The data presented in the first two articles apply to the period from 1950 to 1964; the third article considers developments from 1964 through 1966, and presents some implications of the overall study.

The focus of the overall study is on changes in employment, differentiated by industry or service groups. The basic analysis is primarily concerned with cumulative employment changes in two periods — between 1950 and 1960, and between 1959 and 1964[2] — although some attention is paid to changes between 1964 and 1966. The use of changes in employment is not intended to detract from the importance of other aspects of local economic change, as reflected in output measures, value added, various types of income measurement, demographic aspects, capital expansion, etc. There are at least two good reasons for relying on changes in employment: (1) local data on employment are more readily available and are of a better quality than most other significant local economic series; (2) most local planning bodies, governmental authorities, and business promotional groups give major attention to goals involving employment maintenance or increase.

[1] Throughout this study the term "cities" refers to Standard Metropolitan Statistical Areas. The 10 cities are: Chicago, Philadelphia, Detroit, Boston, St. Louis, Baltimore, Minneapolis-St. Paul, Buffalo, Milwaukee, and Kansas City.

[2] The one-year overlap of the two major periods, which is due to limitations of available data, is thought not to impair seriously the signficance of the results. Use of these periods facilitates significant comparisons; the terminal years do not present any serious problems of disjuncture of cyclical phase.

The "relative growth indicator" used in this analysis corresponds to devices that have been used elsewhere under other names, although the term is employed here in a special way. Regional analysts frequently make a fundamental distinction between two kinds of employment growth in a particular area. For example, Cleveland may show a certain percent gain in employment over a given time period, which is due in part to the fact that the industrial mix of Cleveland includes a number of industries that are growing fast, irrespective of where they are located. However, a part of the growth (or lack of growth) for certain industries may indicate that Cleveland is doing competitively better (or worse) than corresponding segments of that industry are doing elsewhere. There are a number of similar terms used to describe this situation: in the former case, "industry mix" or "proportionality effect," and, in the latter case, "competitive effect," "regional share," or the term used here, "relative growth indicator."[3]

[3] The "industry mix" concept is not explicitly treated in this study, although the effects of industry mix are included in the total percent change figures shown in the tables. In general, "industry mix" is less important than "regional share" in explaining employment changes in Cleveland, Pittsburgh, and Cincinnati. That point is illustrated by Appendix Table II, which shows the relative roles of the two types of changes in the three cities between 1950 and 1960. For the relative roles of "industry mix" and "regional share" in Cleveland's changes, see "Economic Growth in the Cleveland Area — The Past Record and Future Prospects," by Charles W. Walton, *Carroll Business Bulletin*, John Carroll University, Cleveland, Ohio, January 30, 1967. The "regional share" aspects of the findings of that study are broadly similar to those of this study (although less extensive) after allowance is made for differences in coverage, sources, and time periods.

The measurement of regional share is redesignated here as relative growth indicator to avoid misunderstandings concerning geographical coverage.[4] Briefly, regional share refers to a measure of employment change in a given area, for a given industry. Regional share shows the excess or deficit in number employed that *would have been added* if the local industry had exactly kept pace with the nationwide percent rate of gain for that industry. Thus, the measure reflects both percent change over time and the number of employees in the starting period. The results can be compared and offset against each other in a way not feasible by ordinary use of percent changes. Regional share, or relative growth indicator, is extended in this analysis into later time periods than those covered by the Department of Commerce and is utilized for certain analyses in depth of the patterns of change within the areas in this study.

The analysis in the first article applies to the nature of employment changes, by 28 industry and service groups, in Cleveland, Pittsburgh, and Cincinnati, measured against comparable changes in the United States. Derivation and meaning of relative growth indicators are demonstrated by means of comprehensive tables for the three areas. The basic data are then condensed into a series of tables that make it possible to evaluate emerging patterns.

[4] Regional share appears as a key item in a recent compilation of local data, published by the U.S. Department of Commerce. See *Growth Patterns in Employment by County, 1940-1950 and 1950-1960*, by Lowell D. Ashby, Office of Business Economics, U.S. Department of Commerce, 8 volumes, 1965.

The procedure is repeated in the second article, but with the comparison involving patterns in 13 large metropolitan areas, including the three under primary consideration. The 13 areas include all of the largest metropolitan areas in the East and North Central regions of the country, except New York and Washington.[5] The overwhelmingly large population of the New York area and the unusual composition of employment in Washington and New York militate against drawing comparisons between these areas and such cities as Cleveland and Pittsburgh.

The analysis in the third article involves an attempt to check or update the findings for the earlier period by using supplementary (but somewhat limited) data on employment changes between 1964 and 1966.

THREE AREAS COMPARED WITH UNITED STATES PERFORMANCE, 1950-1960

Background. Measures of employment changes between 1950 and 1960 in Cleveland, Pittsburgh, and Cincinnati are compared with corresponding changes in the United States in Tables I-a-c. The measures apply to 28 classifications of manufacturing or service "industries,"[6] which account for about four-fifths of total employment on a national basis. The 28 industry or service groups listed on the left-hand stub are used in the first two articles of this study. The classifications correspond to those of *Growth Patterns in Employment by County*,[7] and are approximately at the two-digit level in terms of the Standard Industrial Classification code.[8]

Fourteen categories of manufacturing are included in the tables. Data for mining, construction, communications, utilities, and finance are shown separately. The trade sector is separated into wholesale and retail trade. Four major service groups are shown: personal services, business and repair services, entertainment and recreation services, and professional services. There is no separate classification for employment by government. The category "Public administration" shown in the Department of Commerce study is omitted in this analysis, although many government employees are included with other listed categories; for example, teachers are included in "Professional services." Several other categories appearing in the Department of Commerce study are also omitted in order to maintain comparability of data between the 1950-1960 and the 1959-1964 periods.[9]

Relative Growth Indicators. Two industry groups in Cleveland are selected from Table I-a for illustrative purposes: No. 11, "Machinery," and No. 12, "Motor vehicles and

[5] "Largest" refers to all SMSA's with a population of more than one million, according to the 1960 Census.

[6] See Technical Note, Appendix.

[7] See Ashby, *op. cit.* Minor alterations have been made in the wording of the industry captions, partly to avoid confusion in the handling of "other" or "miscellaneous" categories.

[8] See Appendix for reconciliation of classifications used here and SIC codes.

[9] In addition to Public administration, the following categories are omitted: Private households; Agriculture; Forestry and fisheries; Armed forces; and Industry not reported. See Technical Note, Appendix.

TABLE I-a
Employment Changes by Industry and Derivation of Relative Growth Indicator
Cleveland Compared with United States
1950-1960

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Number Employed 1950	Number Employed 1960	Percent Change in Employment 1950-1960	Corresponding United States Percent Change	Difference in Percentage Points	Required Change in Number Employed to Match National Rate of Change	Actual Change in Number Employed	Relative Growth Indicator
					(3-4)	(4x1)	(3x1)	(7-6) or (5x1)
1. Mining	785	934	+18.98%	— 29.73%	+48.71	— 233	+ 149	+ 382
2. Contract construction	33,198	32,571	— 1.89	+ 10.38	—12.26	+ 3,444	— 627	— 4,071
3. Food and kindred products	10,956	14,867	+35.70	+ 28.89	+ 6.81	+ 3,165	+ 3,911	+ 746
4. Textile mill products	5,762	4,442	—22.91	— 23.08	+ 0.17	— 1,330	— 1,320	+ 10
5. Apparel	11,292	8,218	—27.22	+ 8.96	—36.18	+ 1,012	— 3,074	— 4,086
6. Lumber, wood products, furniture	4,958	4,598	— 7.26	— 10.33	+ 3.07	— 512	— 360	+ 152
7. Paper and allied products	4,472	5,604	+25.31	+ 23.68	+ 7.63	+ 1,059	+ 1,132	+ 73
8. Printing and publishing	14,123	19,019	+34.67	+ 33.43	+ 1.24	+ 4,721	+ 4,896	+ 175
9. Chemicals and allied products	15,570	18,044	+15.89	+ 31.12	—15.23	+ 4,846	+ 2,474	— 2,372
10. Petroleum and coal products	4,104	3,762	— 8.33	— 2.05	— 6.28	— 84	— 342	— 258
11. Machinery	61,726	70,416	+14.08	+ 46.59	—32.51	+ 28,759	+ 8,690	—20,069
12. Motor vehicles and equipment	26,788	37,479	+39.91	— 3.16	+43.07	— 847	+10,691	+11,538
13. Aircraft and parts, ships, etc.	11,288	12,224	+ 8.29	+102.32	—94.03	+ 11,550	+ 936	—10,614
14. Primary metals	40,654	39,783	— 2.14	+ 4.73	— 6.87	+ 1,923	— 871	— 2,794
15. Fabricated metal products	28,592	31,763	+11.09	+ 53.39	—42.30	+ 15,265	+ 3,171	—12,094
16. Manufacturing, n.e.c.	18,161	19,983	+10.03	+ 14.13	— 4.10	+ 2,567	+ 1,822	— 745
17. Railroads and railway express	16,500	12,131	—26.48	— 32.19	+ 5.71	— 5,311	— 4,369	+ 942
18. Trucking and warehousing	9,120	11,031	+20.95	+ 29.71	— 8.76	+ 2,710	+ 1,911	— 799
19. Transportation other than rail and trucking	10,846	8,695	—19.83	+ 2.75	—22.58	+ 298	— 2,151	— 2,449
20. Communications	8,405	8,860	+ 5.41	+ 15.47	—10.06	+ 1,300	+ 455	— 845
21. Utilities and sanitary service	9,559	9,529	— 0.31	+ 14.44	—14.75	+ 1,381	— 30	— 1,411
22. Wholesale trade	24,449	27,691	+13.26	+ 11.67	+ 1.59	+ 2,852	+ 3,242	+ 390
23. Retail trade	97,850	101,542	+ 3.77	+ 11.35	— 7.58	+ 11,114	+ 3,692	— 7,422
24. Finance, insurance, and real estate	23,162	29,810	+28.70	+ 40.29	—11.59	+ 9,333	+ 6,648	— 2,685
25. Personal services including hotels	19,294	18,386	— 4.71	+ 4.29	— 9.00	+ 828	— 908	— 1,736
26. Business and repair services	15,438	18,460	+19.58	+ 22.66	— 3.08	+ 3,497	+ 3,022	— 475
27. Entertainment, recreation services	5,956	5,461	— 8.31	+ 1.66	— 9.97	+ 99	— 495	— 594
28. Professional services	53,722	81,358	+51.44	+ 57.96	— 6.52	+ 31,139	+27,636	— 3,503
Total of covered industries	586,733	656,661	+11.92%	+ 18.35%*	—*	+134,542	+69,928	—64,614

* Total not adjusted for difference in industry mix between United States and Cleveland and should not be directly compared with the column 3 total to calculate excess or deficit. Totals in columns 6, 7, and 8 are computed by algebraic additions of the vertical columns. (See Technical Note, Appendix.)

Sources: Lowell D. Ashby, *Growth Patterns in Employment by County, 1940-1950 and 1950 and 1960*, Office of Business Economics, U. S. Department of Commerce, 1966 and unpublished estimates for selected industries from U. S. Department of Commerce. (Except for minor differences due to rounding, Relative Growth Indicator is identical with "Regional Share" data shown in U. S. Department of Commerce study.)

TABLE I-b
Employment Changes by Industry and Derivation of Relative Growth Indicator
Pittsburgh Compared with United States
1950-1960

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Number Employed 1950	Number Employed 1960	Percent Change in Employment 1950-1960	Corresponding United States Percent Change	Difference in Percentage Points	Required Change in Number Employed to Match National Rate of Change	Actual Change in Number Employed	Relative Growth Indicator
					(3-4)	(4x1)	(3x1)	(7-6) or (5x1)
1. Mining	30,756	11,409	—62.91%	— 29.73%	—33.18	— 9,144	—19,347	— 10,203
2. Contract construction	43,897	42,118	— 4.05	+ 10.38	—14.43	+ 4,554	— 1,779	— 6,333
3. Food and kindred products	19,143	22,268	+16.32	+ 28.89	—12.56	+ 5,530	+ 3,125	— 2,405
4. Textile mill products	1,262	512	—59.43	— 23.08	—36.37	— 291	— 750	— 459
5. Apparel	2,120	2,259	+ 6.55	+ 8.96	— 2.41	+ 189	+ 139	— 50
6. Lumber, wood products, furniture	2,794	3,199	+14.49	— 10.33	+24.84	— 289	+ 405	+ 694
7. Paper and allied products	2,899	3,385	+16.76	+ 23.68	— 6.92	+ 686	+ 486	— 200
8. Printing and publishing	9,399	12,701	+35.13	+ 33.43	+ 1.70	+ 3,142	+ 3,302	+ 160
9. Chemicals and allied products	7,485	9,356	+24.99	+ 31.12	— 6.13	+ 2,330	+ 1,871	— 459
10. Petroleum and coal products	6,132	1,885	—69.26	— 2.05	—67.21	— 126	— 4,247	— 4,121
11. Machinery	44,562	51,902	+16.47	+ 46.59	—30.12	+ 20,762	+ 7,340	— 13,422
12. Motor vehicles and equipment	2,305	3,223	+39.82	— 3.16	+42.99	— 73	+ 918	+ 991
13. Aircraft and parts, ships, etc.	5,631	6,122	+ 8.71	+102.32	—93.61	+ 5,762	+ 491	— 5,271
14. Primary metals	148,301	134,891	— 9.04	+ 4.73	—13.77	+ 7,014	—13,410	— 20,424
15. Fabricated metal products	21,937	27,623	+25.92	+ 53.39	—27.47	+ 11,712	+ 5,686	— 6,026
16. Manufacturing, n.e.c.	32,896	28,923	—12.08	+ 14.13	—26.21	+ 4,648	— 3,973	— 8,621
17. Railroads and railway express	32,444	21,196	—34.67	— 32.19	— 2.48	— 10,444	—11,248	— 804
18. Trucking and warehousing	9,405	11,046	+17.45	+ 29.71	—12.27	+ 2,794	+ 1,641	— 1,153
19. Transportation other than rail and trucking	10,493	8,096	—22.85	+ 2.75	—25.59	+ 288	— 2,397	— 2,685
20. Communications	10,473	10,050	— 4.04	+ 15.47	—19.51	+ 1,620	— 423	— 2,043
21. Utilities and sanitary service	13,333	13,689	+ 2.67	+ 14.44	—11.76	+ 1,926	+ 356	— 1,570
22. Wholesale trade	25,869	27,884	+ 7.78	+ 11.67	— 3.87	+ 3,018	+ 2,015	— 1,003
23. Retail trade	125,049	121,153	— 3.12	+ 11.35	—14.47	+ 14,199	— 3,896	— 18,095
24. Finance, insurance, and real estate	26,453	32,416	+22.54	+ 40.29	—17.75	+ 10,659	+ 5,963	— 4,696
25. Personal services including hotels	22,683	22,355	— 1.45	+ 4.29	— 5.74	+ 974	— 328	— 1,302
26. Business and repair services	16,261	18,720	+15.12	+ 22.66	— 7.54	+ 3,684	+ 2,459	— 1,225
27. Entertainment, recreation services	7,139	7,602	+ 6.49	+ 1.66	+ 4.83	+ 119	+ 463	+ 344
28. Professional services	65,996	96,136	+45.67	+ 57.96	—12.29	+ 38,253	+30,140	— 8,113
Total of covered industries	747,117	752,119	+ 0.67%	+ 18.35%*	—*	+123,496	+ 5,002	—118,494

* Total not adjusted for difference in industry mix between United States and Pittsburgh and should not be directly compared with the column 3 total to calculate excess or deficit. Totals in columns 6, 7, and 8 are computed by algebraic additions of the vertical columns. (See Technical Note, Appendix.)

Sources: Lowell D. Ashby, *Growth Patterns in Employment by County*, 1940-1950 and 1950-1960, Office of Business Economics, U. S. Department of Commerce, 1966 and unpublished estimates for selected industries from U. S. Department of Commerce. (Except for minor differences due to rounding, Relative Growth Indicator is identical with "Regional Share" data shown in U. S. Department of Commerce study.)

TABLE I-c
Employment Changes by Industry and Derivation of Relative Growth Indicator
Cincinnati Compared with United States
1950-1960

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Number Employed 1950	Number Employed 1960	Percent Change in Employment 1950-1960	Corresponding United States Percent Change	Difference in Percentage Points	Required Change in Number Employed to Match National Rate of Change	Actual Change in Number Employed	Relative Growth Indicator
					(3-4)	(4x1)	(3x1)	(7-6) or (5x1)
1. Mining	346	523	+ 51.16%	— 29.73%	+ 80.92	— 103	+ 177	+ 280
2. Contract construction	23,516	26,435	+ 12.41	+ 10.38	+ 2.04	+ 2,440	+ 2,919	+ 479
3. Food and kindred products	15,941	17,591	+ 10.35	+ 28.89	— 18.54	+ 4,605	+ 1,650	— 2,955
4. Textile mill products	1,366	1,045	— 23.50	— 23.08	— 0.44	— 315	— 321	— 6
5. Apparel	6,557	5,113	— 22.02	+ 8.96	— 30.97	+ 587	— 1,444	— 2,031
6. Lumber, wood products, furniture	5,899	5,374	— 8.90	— 10.33	+ 1.42	— 609	— 525	+ 84
7. Paper and allied products	6,990	6,013	— 13.98	+ 23.68	— 37.66	+ 1,655	— 977	— 2,632
8. Printing and publishing	11,142	13,350	+ 19.82	+ 33.43	— 13.62	+ 3,724	+ 2,208	— 1,516
9. Chemicals and allied products	11,529	15,716	+ 36.32	+ 31.12	+ 5.20	+ 3,588	+ 4,187	+ 599
10. Petroleum and coal products	1,963	2,018	+ 2.80	— 2.05	+ 4.85	— 40	+ 55	+ 95
11. Machinery	27,548	30,326	+ 10.08	+ 46.59	— 36.51	+12,835	+ 2,778	—10,057
12. Motor vehicles and equipment	9,028	12,283	+ 36.05	— 3.16	+ 39.22	— 286	+ 3,255	+ 3,541
13. Aircraft and parts, ships, etc.	715	12,973	+1,714.41	+102.32	+1,612.03	+ 732	+12,258	+11,526
14. Primary metals	7,401	5,298	— 28.42	+ 4.73	— 33.14	+ 350	— 2,103	— 2,453
15. Fabricated metal products	9,331	13,019	+ 39.52	+ 53.39	— 13.87	+ 4,982	+ 3,688	— 1,294
16. Manufacturing, n.e.c.	17,150	17,369	+ 1.28	+ 14.13	— 12.86	+ 2,424	+ 219	— 2,205
17. Railroads and railway express	14,154	9,160	— 35.28	— 32.19	— 3.09	— 4,556	— 4,994	— 438
18. Trucking and warehousing	5,918	8,239	+ 39.22	+ 29.71	+ 9.51	+ 1,758	+ 2,321	+ 563
19. Transportation other than rail and trucking	5,547	4,718	— 14.95	+ 2.75	— 17.69	+ 152	— 829	— 981
20. Communications	5,172	6,406	+ 23.86	+ 15.47	+ 8.39	+ 800	+ 1,234	+ 434
21. Utilities and sanitary service	6,022	6,738	+ 11.89	+ 14.44	— 2.54	+ 870	+ 716	— 154
22. Wholesale trade	16,866	16,939	+ 0.43	+ 11.67	— 11.23	+ 1,968	+ 73	— 1,895
23. Retail trade	67,687	68,313	+ 0.92	+ 11.35	— 10.43	+ 7,689	+ 626	— 7,063
24. Finance, insurance, and real estate	15,948	20,646	+ 29.46	+ 40.29	— 10.84	+ 6,426	+ 4,698	— 1,728
25. Personal services including hotels	14,415	11,904	— 17.42	+ 4.29	— 21.71	+ 619	— 2,511	— 3,130
26. Business and repair services	9,954	11,070	+ 11.21	+ 22.66	— 11.44	+ 2,255	+ 1,116	— 1,139
27. Entertainment, recreation services	4,042	4,099	+ 1.41	+ 1.66	— 0.25	+ 67	+ 57	— 10
28. Professional services	32,919	48,502	+ 47.34	+ 57.96	— 10.63	+19,081	+15,583	— 3,498
Total of covered industries	355,066	401,180	+ 12.99%	+ 18.35%*	—*	+73,698	+46,114	—27,584

* Total not adjusted for difference in industry mix between United States and Cincinnati and should not be directly compared with the column 3 total to calculate excess or deficit. Totals in columns 6, 7, and 8 are computed by algebraic additions of the vertical columns. (See Technical Note, Appendix.)

Sources: Lowell D. Ashby, *Growth Patterns in Employment by County*, 1940-1950 and 1950-1960, Office of Business Economics, U. S. Department of Commerce, 1966 and unpublished estimates for selected industries from U. S. Department of Commerce. (Except for minor differences due to rounding, Relative Growth Indicator is identical with "Regional Share" data shown in U. S. Department of Commerce study.)

equipment." The table shows that employment in machinery manufacturing in Cleveland rose from 61,726 in 1950 (column 1) to 70,416 in 1960 (column 2), a gain of 14.08 percent (column 3). In the United States, the gain for "Machinery" was 46.59 percent (column 4). The difference between the two rates of change is minus 32.51 percent for Cleveland (column 5). Thus, in terms of *number employed* in the machinery industry, Cleveland would have needed a gain of 28,759 employees to match the national rate of growth (column 6), whereas the actual gain for the industry was only 8,690 employees (column 7). The difference between the last two figures, or a "deficit" of 20,069 (column 8), is the relative growth indicator (regional share) for machinery in Cleveland for 1950-1960.[10]

While the relative growth indicator for machinery in Cleveland is negative, it does not mean that there was an outright decline in employment in that industry, although some industries did experience employment declines. What it does mean, however, is that, whether measured in terms of percent change or change in the number of people employed between 1950 and 1960, Cleveland's largest manufacturing industry lost substantial ground to other parts of the nation. To put it another way, the machinery industry showed a sharper growth in many parts of the country where it is less highly developed than it did in Cleveland, which is recognized as an established stronghold of the industry.

The behavior of the motor vehicles industry in Cleveland between 1950 and 1960 was in marked contrast to that of machinery. As Table I-a shows, between 1950 and 1960, employment in the Cleveland SMSA in the "Motor vehicles and equipment" industry (No. 12) rose from 26,788 to 37,479, a gain of 39.91 percent. At the same time, the industry in the United States showed a *decline* in employment of 3.16 percent, with a resulting difference for Cleveland of *plus* 43.07 percent. If Cleveland had only matched the national rate of change, it would have lost 847 employees in the auto industry; but Cleveland actually gained 10,691 employees. Consequently, the relative growth indicator for the automobile industry in Cleveland was plus 11,538.

This statistical showing confirms that the motor vehicles industry had a burst of growth in Cleveland in the 1950's, due to the building of important assembly and subassembly plants, thus adding to the head start that Cleveland had previously experienced in the manufacture of auto parts. Corresponding figures for Detroit would be expected to show (and will show in the second article of this study) that decentralization within the auto industry had an unfavorable impact on the Detroit employment picture. As shown in Table I-a, the relative gain in the motor vehicles industry in Cleveland between 1950 and 1960 offset more than half of the impact of the relative decline of the machinery industry.

[10] The relative growth indicator may be derived either by comparing the required change in number employed to match the national rate of change (column 6) with actual change in number employed (column 7), or by applying the "difference in percentage points" (column 5) to the number employed in 1950 (column 1).

Cleveland's growth indicators for the trade and service groups (classifications 21 through 28) were mostly negative, as was the total of covered industries. It should not be overlooked, however, that attainment of a rate of growth in trade and services comparable to that of the United States is indeed a stiff target, particularly because of the influence of the rapid growth of the South and West. Not surprisingly, many large metropolitan areas of the East and North Central portions of the country also show similar deficits when compared with the United States growth rate of 11.35 percent for retail trade.

Beyond the few industry or service groups discussed in connection with the showing for Cleveland (Table I-a), the performances of other groups reveal much significant information, which is not discussed here because of space limitations. Tables I-b and I-c provide comparable information for Pittsburgh and Cincinnati.

THREE AREAS COMPARED WITH UNITED STATES, 1959-1964

While similar methodology and industry groups are used to compare employment changes between 1959 and 1964, the sources of data are somewhat different (see Table II and Technical Note, Appendix). The changes for 1959-1964 are presented in Table II, which omits some columns used in Table I to show the derivation of the relative growth indicator. Table II shows, for each classification in Cleveland, Pittsburgh, and Cincinnati, the number employed in 1959, the percent change in employment between 1959 and 1964, and the relative growth indicator, derived from comparison with the United States rate of change.

"Machinery" and "Motor vehicles and equipment" are used again to evaluate relative performance between 1959 and 1964. In appraising the marked contrast between the two periods for the two industries, it should be noted that the indicated changes are cumulative, and that the second period is half as long as the first period.[11]

During the five-year interval between 1959 and 1964, employment in the machinery industry in Cleveland grew by 5.12 percent, contrasted to a gain of 15.80 percent for the nation (see Table II). The relative growth indicator amounted to minus 6,445; thus, employment in "Machinery" in Cleveland failed to rise as much as would be required to match the national rate of gain. (The deficit is large partly because of the large size of the machinery industry in Cleveland.) Nevertheless, the relative growth indicator for machinery in Cleveland between 1959 and 1964 declined by less than half as much as between 1950 and 1960. Thus, Cleveland continued to lose ground relative to the nation in machinery employment in the second period, but not as markedly as in the first period.

For "Motor vehicles and equipment," the story is again quite different. As seen earlier, the surge of employment in the auto industry during the 1950's enabled Cleveland to offset some of its other relative losses; however, the pattern during 1959-1964 was in marked

[11] Statistical adjustment for the fact that one period is twice as long as the other, and presentation of such adjustment in the tables, would have constituted an additional layer of statistical operations that would be unnecessarily burdensome to the presentation.

TABLE II

Employment Change by Industry and Relative Growth Indicator
Cleveland, Pittsburgh, and Cincinnati Compared with United States
1959-1964

	(1) United States	(2)	(3) Cleveland	(4)	(5)	(6) Pittsburgh	(7)	(8)	(9) Cincinnati	(10)
	Percent Change in Employment 1959-1964	Number Employed 1959	Percent Change in Employment 1959-1964	Relative Growth Indicator	Number Employed 1959	Percent Change in Employment 1959-1964	Relative Growth Indicator	Number Employed 1959	Percent Change in Employment 1959-1964	Relative Growth Indicator
1. Mining	—15.44%	1,195	+16.49%	+ 382	12,053	— 28.31%	— 1,551	520e	—10.58%	+ 25
2. Contract construction	+ 5.49	24,734	+10.78	+ 1,309	32,445	— 8.87	— 4,658	16,182	— 4.36	— 1,593
3. Food and kindred products	— 4.28	15,160	—25.89	— 3,276	17,655	— 11.73	— 1,315	18,423	— 7.75	— 638
4. Textile mill products	— 3.97	5,215e	— 6.10	— 111	250e	+130.80	+ 337	1,047e	—28.84	— 260
5. Apparel	+ 7.58	7,021	—20.48	+ 906	1,980	+ 15.86	+ 164	5,932e	—22.30	— 1,773
6. Lumber, wood products, furniture	+ 0.88	5,134e	—21.35	— 1,141	2,193	+ 8.03	+ 157	5,153e	—26.84	— 1,428
7. Paper and allied products	+ 4.21	4,952e	+ 5.70	+ 74	3,819	— 25.82	— 1,147	6,275e	+ 6.50	+ 144
8. Printing and publishing	+ 7.91	14,559	+ 8.70	+ 115	9,441	— 15.46	— 2,207	12,101	— 4.65	— 1,519
9. Chemicals and allied products	+ 2.13	16,471	—13.59	— 2,589	5,721	— 5.98	— 464	13,681	—16.93	— 2,607
10. Petroleum and coal products	—14.74	1,612	— 3.47	+ 182	605e	+ 15.04	+ 180	1,545e	— 8.61	+ 95
11. Machinery	+15.80	60,351e	+ 5.12	— 6,445	41,390e	+ 1.11	— 6,080	26,317	+ 6.83	— 2,360
12. Motor vehicles and equipment	+11.27	36,619	+ 3.73	— 2,761	1,701	+ 36.51	+ 429	11,859	— 0.71	— 1,421
13. Aircraft and parts, ships, etc.	—12.37	14,712e	—31.35	— 2,792	6,980e	— 36.07	— 1,654	18,398e	—33.92	— 3,965
14. Primary metals	— 4.28	43,245	—13.47	— 3,973	130,755	— 16.25	—15,650	4,308e	+ 0.11	+ 180
15. Fabricated metal products	— 0.69	36,098	— 9.28	— 3,101	29,698	— 19.64	— 5,628	13,002	— 0.74	— 6
16. Manufacturing, n.e.c.	+ 2.96	14,275	+30.66	+ 3,954	24,884e	— 2.78	— 1,428	16,236	— 9.21	— 1,975
17. Railroads and railway express	+18.34	12,100e	—19.01	— 81	21,000e	— 24.76	— 1,350	8,600e	—18.61	— 23
18. Trucking and warehousing	+10.57	10,625	+ 6.21	— 463	10,171	+ 8.86	— 174	7,555	+ 1.59	— 679
19. Transportation other than rail and trucking	+ 5.68	7,535e	+11.19	+ 415	8,965	+ 3.13	— 228	3,801	+ 7.81	+ 81
20. Communications	— 0.50	9,801e	— 1.04	— 53	8,868	+ 2.26	+ 244	6,548	+ 1.39	+ 124
21. Utilities and sanitary service	+ 3.69	5,693e	+ 0.80	— 164	13,248	— 29.24	— 4,363	4,772e	— 2.35	— 288
22. Wholesale trade	+ 7.53	47,019	+ 0.13	— 3,479	47,997	— 19.96	—13,192	26,761	+ 3.14	— 1,175
23. Retail trade	+10.75	90,100	+ 6.46	— 3,865	107,896	— 0.10	—11,704	61,222	+ 0.22	— 6,447
24. Finance, insurance, and real estate	+16.35	29,488	+16.45	+ 31	32,332	+ 0.66	— 5,072	19,595	+13.18	— 622
25. Personal services including hotels	+12.23	15,632	+ 2.44	— 1,530	15,224	+ 7.30	— 751	9,854	+ 6.89	— 526
26. Business and repair services	+37.83	16,031	+26.94	— 1,746	12,734	+ 25.39	— 1,584	6,675	+54.10	+ 1,086
27. Entertainment, recreation services	+ 6.75	6,338	—16.84	— 1,495	7,351	— 15.41	— 1,631	3,966	+16.44	+ 384
28. Professional services	+30.83	40,632	+30.82	— 5	55,945	+ 11.64	—10,736	21,719	+27.36	— 753
Total of covered industries	+ 8.69%*	592,307	+ 3.26%	—31,702	663,301	— 6.10%	—91,056	352,047	— 0.19%	—27,939

e — Estimated.

* Total not adjusted for difference in industry mix.

Sources: *County Business Patterns*, 1959 and 1964, Bureau of the Census, U. S. Department of Commerce and unpublished estimates of the U. S. Railroad Retirement Board

contrast. The rise in auto employment in Cleveland in 1959-1964 was only 3.73 percent as against the national gain of 11.27 percent. As a consequence, Cleveland's relative growth indicator for "Motor vehicles and equipment" during 1959-1964 showed a decline of 2,761 (see Table II).

The information provided in Tables I and II can be summarized and rearranged to bring out the highlights of developments in each of the two periods under review, and in each of the three metropolitan areas — Cleveland, Pittsburgh, and Cincinnati.

CLEVELAND PATTERN COMPARED WITH THE UNITED STATES, 1950-1960 and 1959-1964

It is apparent from Table III-a that employment in at least three of Cleveland's major manufacturing industries — "Machinery," "Fabricated metal products," and "Aircraft and parts, ships, etc." — lost considerable ground, relative to the national showing, during 1950-1960.[12] The negative showings of the relative growth indicators dominate the picture for the first period, although some positive growth in employment actually did take place in those three industries. At the same time, the highly favorable showing of the "Motor vehicles and equipment" industry provided a substantial, although far from complete, offset.

In the second period, 1959-1964, the assist given to employment by the motor vehicles industry in Cleveland was no longer a favorable factor in the comparison with the United States performance; in fact, the relative growth indicator for the industry was appreciably negative in the second period. For "Machinery," "Fabricated metal products," and "Aircraft, etc.," the unfavorable performances of the first period were repeated in the second period, although not to the same extent (see Table III-a). In the case of the machinery industry, for example, the score in the second period was minus 6,445, whereas it had been minus 20,069 in the first period.

The fact that these four industries — Machinery, Fabricated metal products, Motor vehicles, and Aircraft and parts, ships, etc. — are among Cleveland's leading industries is a major reason for the large relative growth indicators, whether plus or minus. The figures in Table III-a on number employed in 1960, by industry, provide some perspective on the relative size of the major industries in Cleveland.

There are two industries with favorable performance changes in both periods — "Mining" and "Printing and publishing" — but only one — the latter — is of relative importance in the Cleveland product mix (see Category A in Table III-a). The positive relative growth indicators, based on the United States comparison, indicate that employment grew faster in the two industries than in the nation in *both* periods. Relative impacts, however, were not large. The performance of

[12] Not all industry or service groups included in Tables I and II are carried over into the summary Table III. Industries showing relatively insignificant changes are omitted from the scoring. Table footnotes indicate the cut-off points, which are not quite the same for the three cities, insofar as smaller numbers for regional share indicators are more significant in Cincinnati than Cleveland or Pittsburgh, because the former is a smaller metropolitan area (in terms of total population or total employment).

TABLE III-a
Summary of Employment Changes by Industry
Cleveland Compared with United States
1950-1960 and 1959-1964

	Relative Growth Indicator		Number Employed
	1950-1960	1959-1964	1960
A. Favorable Changes in Both Periods			
Mining	+ 382	+ 382	934
Printing and publishing	+ 175	+ 115	19,019
B. Unfavorable Changes in Both Periods			
Machinery	—20,069	— 6,445	70,416
Fabricated metal products	—12,094	— 3,101	31,763
Aircraft and parts, ships, etc.	—10,614	— 2,792	12,224
Retail trade	— 7,422	— 3,865	101,542
Primary metals	— 2,794	— 3,973	39,783
Chemicals and allied products	— 2,372	— 2,589	18,044
C. Significant Changes in One Period Only			
Railroads and railway express	+ 942	—	12,131
Petroleum and coal products	—	+ 182	3,762
Professional services	— 3,503	—	81,358
Finance, insurance, and real estate	— 2,685	—	29,810
Business and repair services	—	— 1,746	18,460
Personal services including hotels	—	— 1,530	18,386
Entertainment, recreation services	—	— 1,495	5,461
D. Marked Shifts Between Two Periods			
Motor vehicles and equipment	+11,538	— 2,761	37,479
Food and kindred products	+ 746	— 3,276	14,867
Wholesale trade	+ 390	— 3,479	27,691
Lumber, wood products, furniture	+ 152	— 1,141	4,598
Apparel	— 4,086	+ 906	8,218
Contract construction	— 4,071	+ 1,309	32,571
Transportation other than rail and trucking	— 2,449	+ 415	8,695
TOTAL of covered industries*	—64,614	—31,702	656,661

*Includes 6 covered industries not listed in the table. Except for "Manufacturing, not elsewhere classified," the unlisted industries show relatively small changes; i.e., (for this table) declines of less than 2,000 in the first period, declines of less than 1,000 in the second (or shorter) period, or increases of less than 100 in either period.

Sources: Data are derived from Table I-a and Table II

"Mining" is attributable in part to a large underwater salt mine in Lake Erie, located at the edge of the Cleveland downtown district.

Other highlights of the Cleveland showing in Table III-a are as follows: The service industries were on the whole relatively unfavorable (Category C). "Retail trade" was markedly unfavorable in both periods (Category B). Railroad employment was favorable in the first period (Category C). "Wholesale trade" and "Lumber, wood products, furniture" yielded favorable scores in the first period, but were unfavorable in the second (Category D). In contrast, "Apparel" and "Contract construction" scored substantial negative relative growth indicators in the first period, but shifted to a positive score in the second period (Category D).

The total figure for the covered industries shown on the bottom line of Table III-a should be interpreted with caution.[13] The principal purpose of Table III, and indeed of the entire study, is to bring out the strong and weak spots among the various industries in the respective cities rather than to evaluate the totals. To the extent that the latter is considered, it is done mainly in connection with the 13-city comparisons to be discussed in the succeeding article.

PITTSBURGH PATTERN COMPARED WITH THE UNITED STATES, 1950-1960 and 1959-1964

The pattern of changes in employment for Pittsburgh's industries (see Table III-b) is generally less favorable than Cleveland's, and, in fact, less favorable than a large number of the major metropolitan areas discussed in the second article. The obstacles encountered in Pittsburgh's growth (due to a complex of changes in marketing, technological, and labor-force factors) are recognized to have been serious. At the same time, the vigor with which local business and governmental groups in Pittsburgh have approached the problems, both in analysis and action, is known to compare quite favorably with that demonstrated in other American cities.[14]

Leading Pittsburgh industries as well as other important industries showed marked declines in relative growth indicators for both time periods (see Table III-b, Category B). In the case of "Primary metals," including steel, the negative figure for the second period, 1959-1964, was more significant than that for the first period, after allowance for the shorter duration of the second period (minus 15,650 for the second period against minus 20,424 for the first period). "Machinery" and "Mining," however, showed less significant negative figures for the relative growth indicators in the second period. Both "Primary metals" and "Mining" registered outright declines in employment in both periods (see Tables I-b and II). The "Machinery" industry had some growth in employment in both periods, but the growth rate fell considerably short of the national rate, thus producing the declines in the relative growth indicators. Only two relatively small industries — "Motor vehicles and equipment" and "Lumber,

[13] See Technical Note, Appendix.

[14] Outstanding in such developments are the organizational arrangements for cooperation between business and governmental groups, the renovation of the Golden Triangle of downtown Pittsburgh, and the *Economic Study of the Pittsburgh Region*, conducted by the Pittsburgh Regional Planning Association, directed by Edgar M. Hoover, 1963-1964.

TABLE III-b
Summary of Employment Changes by Industry
Pittsburgh Compared with United States
1950-1960 and 1959-1964

	Relative Growth Indicator		Number Employed
	1950-1960	1959-1964	1960
A. Favorable Changes in Both Periods			
Motor vehicles and equipment	+ 991	+ 429	3,223
Lumber, wood products, furniture	+ 694	+ 157	3,199
B. Unfavorable Changes in Both Periods			
Primary metals	— 20,424	—15,650	134,891
Retail trade	— 18,095	—11,704	121,153
Machinery	— 13,422	— 6,080	51,902
Mining	— 10,203	— 1,551	11,409
Professional services	— 8,113	—10,736	96,136
Contract construction	— 6,333	— 4,658	42,118
Fabricated metal products	— 6,026	— 5,628	27,623
Aircraft and parts, ships, etc.	— 5,271	— 1,654	6,122
Finance, insurance, and real estate	— 4,696	— 5,072	32,416
Food and kindred products	— 2,405	— 1,315	22,268
C. Significant Changes in One Period Only			
Textile mill products	—	+ 337	512
Apparel	—	+ 164	2,259
Transportation other than rail and trucking	— 2,043	—	8,096
Wholesale trade	—	—13,192	27,884
Utilities and sanitary service	—	— 4,363	13,689
Business and repair services	—	— 1,584	18,720
Railroads and railway express	—	— 1,350	21,196
Paper and allied products	—	— 1,147	3,385
D. Marked Shifts Between Two Periods			
Entertainment, recreation services	+ 344	— 1,631	7,602
Printing and publishing	+ 160	— 2,207	12,701
Petroleum and coal products	— 4,121	+ 180	1,885
Communications	— 2,043	+ 244	10,050
TOTAL of covered industries*	—118,494	—91,056	752,119

*Includes 4 covered industries not listed in the table. Except for "Manufacturing, not elsewhere classified," the unlisted industries show relatively small changes; i.e., (for this table) declines of less than 2,000 in the first period, declines of less than 1,000 in the second (or shorter) period, or increases of less than 100 in either period.

Sources: Data are derived from Table I-b and Table II

wood products, furniture" — registered significant favorable changes in both periods (see Table III-b, Category A). Favorable changes in only one period are shown in Categories C and D of Table III-b. These include "Printing and Publishing" in the first period, and the following industries in the second period: "Textile mill products," "Apparel," "Petroleum and coal products," and "Communications." Trade and service groups registered consistently unfavorable showings, except for "Entertainment, recreation services," which scored a modest positive figure for the first period, only to be followed by a large negative showing in the second period (Category D).

CINCINNATI PATTERN COMPARED WITH THE UNITED STATES, 1950-1960 and 1959-1964

The general pattern of employment changes in Cincinnati is similar to that of Cleveland in at least one important respect; namely, in each case a single industry provided a surge in the 1950-1960 period that offset much of the unfavorable showing of the more traditional industries. (See Table III-c.) In the case of Cincinnati, the favorable development occurred in "Aircraft and parts, ships, etc.," and was concentrated in the very large Cincinnati plants manufacturing airplane engines for a nationally prominent concern.

The traditional Cincinnati industries that lost ground relative to the United States were "Machinery" in both periods (Category B), "Food and kindred products" in the first period (Category C), and "Chemicals and allied products" in the second period (Category C). One industry, "Communications," showed moderately favorable changes in both periods (Category A). "Motor vehicles and equipment" had a favorable record in the first period, but lost ground in the second period (Category D). Several other industries had moderate gains in either the first or the second period (Categories C and D). "Primary metals" and "Paper and allied products" showed moderate gains in the second period, following large relative declines in the first period (Category D). In the case of the former, a single firm was largely responsible. In the case of trade and services, the Cincinnati showing is relatively unfavorable, except for the marked gain in "Business and repair services" in the 1959-1964 period (Category C).

The Cincinnati employment pattern appears to be mixed, and resembles that of Cleveland more than Pittsburgh. This is the case despite the fact that Cincinnati's historic development considerably preceded Cleveland's, which makes Cincinnati more nearly akin to Pittsburgh in maturity of development. In the "Total of covered industries," Cincinnati's score appears relatively more favorable than Cleveland's for the first period — minus 27,584 as against Cleveland's minus 64,614. (Cincinnati's advantage in the first period seems clear, even after allowing for Cleveland's greater population.) In the second period, 1959-1964, Cincinnati's negative relative growth indicator in total was as large for the five-year interval as it had been for the previous ten-year interval. Cleveland, on the other hand, showed a five-year total about half as large as the ten-year total of the first period (minus 31,702 against minus 64,614), thus indicating that Cleveland's margin of lag behind the nation was not accelerating,

TABLE III-c
Summary of Employment Changes by Industry
Cincinnati Compared with United States
1950-1960 and 1959-1964

	Relative Growth Indicator		Number Employed
	1950-1960	1959-1964	1960
A. Favorable Changes in Both Periods			
Communications	+ 434	+ 124	6,406
B. Unfavorable Changes in Both Periods			
Machinery	—10,057	— 2,360	30,326
Retail trade	— 7,063	— 6,447	68,313
Professional services	— 3,498	— 753	48,502
Apparel	— 2,031	— 1,773	5,113
Wholesale trade	— 1,895	— 1,175	16,939
Printing and publishing	— 1,516	— 1,519	13,350
C. Significant Changes in One Period Only			
Trucking and warehousing	+ 523	—	8,239
Mining	+ 280	—	523
Business and repair services	—	+ 1,086	11,070
Entertainment, recreation services	—	+ 384	4,099
Personal services including hotels	— 3,130	—	11,904
Food and kindred products	— 2,955	—	17,591
Finance, insurance, and real estate	— 1,728	—	20,646
Lumber, wood products, furniture	—	— 1,428	5,374
D. Marked Shifts Between Two Periods			
Aircraft and parts, ships, etc.	+11,526	— 3,965	12,973
Motor vehicles and equipment	+ 3,541	— 1,421	12,283
Chemicals and allied products	+ 599	— 2,607	15,716
Contract construction	+ 479	— 1,593	26,435
Paper and allied products	— 2,632	+ 144	6,013
Primary metals	— 2,453	+ 180	5,298
TOTAL of covered industries*	—27,584	—27,939	401,180

*Includes 7 covered industries not listed in the table. Except for "Manufacturing, not elsewhere classified," the unlisted industries show relatively small changes; i.e., (for this table) declines of less than 1,500 in the first period, declines of less than 750 in the second (or shorter) period, or increases of less than 100 in either period.

Sources: Data are derived from Table I-c and Table II

while Cincinnati's was. A similar point can be made if "percent change in employment" (Tables I and II) is utilized in place of the relative growth indicator. That is, Cincinnati did better than Cleveland in the first period, but slipped in the second period.

APPENDIX

Technical Note*

* Applies to the three articles in the series, and will be included at the end of each article.

Geographical Coverage. Wherever the term "city" or "metropolitan area" is used in the text, it refers to the "Standard Metropolitan Statistical Area," composed of one or more counties as designated in the official list. The single exception is Boston, for which the official SMSA cuts across county lines, as is the case generally in the New England States. As a substitute for the Boston SMSA, this study uses a composite of data for the entire counties of Essex, Middlesex, Norfolk, and Suffolk. The resulting totals for "Boston," although not necessarily the percent changes, become somewhat larger than would be the case for the official SMSA. (See footnote of Table IV for the population differences involved.)

County composition of the SMSA's used here is that defined by the Bureau of the Budget in 1964. Data for earlier years were adjusted, where necessary, by addition of data for required counties. Thus, Cleveland, in this study includes Medina and Geauga Counties, as well as Cuyahoga and Lake Counties. Likewise, the Cincinnati SMSA includes Dearborn County, Indiana, in addition to three counties in Ohio and three counties in Kentucky.

Use of the SMSA unit has a particular drawback in the case of at least one of the covered industries for one of the SMSA's; that is, "Primary metals" for the Chicago SMSA. A large part of the steel industry of the greater Chicago area is located in the Gary-Hammond-East Chicago SMSA and, therefore, does not appear in our figures for the Chicago SMSA. This has the effect of seriously understating the Chicago performance for "Primary metals" for the 1950-1960 period. Thus, including Gary, etc., would have the effect of altering the percent change figure for Chicago shown in Table V from minus 14 percent to minus 4 percent, accompanied by a virtual elimination of the negative figure for the relative growth indicator. For the 1959-1964 period, however, use of the enlarged area would make little change in the Chicago scores for percent change or relative growth indicator.

As a supplement to the footnote shown in Table I, it may be noted that the data on numbers employed in 1950 and 1960, as shown in columns 1 and 2, and also the basic employment data used in Table V, were drawn from unpublished figures for the various SMSA's provided by the Office of Business Economics, U. S. Department of Commerce. With certain exceptions, these data could have been computed by adding the appropriate counties making up the SMSA's, as shown in the published volumes of *Growth Patterns in Employment by County*. (The exceptions are noted below in connection with the "Miscellaneous" problem.)

Basic data for our treatment of the 1959-1964 period were obtained from *County Business Patterns*, U.S. Department of Commerce and U.S. Department of Health, Education, and Welfare. For the 1959 data, as drawn

from that source, it was necessary to add figures for the individual counties in order to obtain SMSA totals. For the 1964 data, however, the published volumes of *County Business Patterns* provide data in SMSA form. In utilizing data drawn from this source, it was necessary by means of estimation to fill certain gaps occasioned by the "nondisclosure" rule. Figures on numbers employed that were derived from our own estimates are indicated in the appropriate columns of Table II by a notation of "e," although such notation is not carried through the succeeding computation columns. In the case of the estimates within the tables for Cleveland, Pittsburgh, and Cincinnati, it was possible to obtain sufficient supplementary information to warrant considerable confidence in the estimates. Estimates, wherever they occur, for the other areas are less fully documented.

Industry Coverage. The 28 industry or service groups used consistently in this study were selected to serve as a least common denominator, for purposes of comparability, between the breakdowns provided by the OBE study already identified (which provided the basic data for our 1950-1960 treatment) and *County Business Patterns* (which provided the basic data for our 1959-1964 treatment). Certain minor changes in the industry captions were effected for clarity; i.e., we use the caption "Aircraft and parts, ships, etc." in place of "Other transportation equipment," referring to transportation equipment other than "Motor vehicles and equipment." In the process of achieving comparability it was necessary to drop the category of "Public administration," as shown in the OBE study (an omission noted in the text); on the other hand, it was possible to include the category "Railroads and railway express," which is not contained in the *County Business Patterns* summaries, by obtaining special estimates for the SMSA's involved from the U. S. Railroad Retirement Board.

An important part of the data used in the 1950-1960 treatment represents certain special breakdowns in the form of unpublished data provided by the OBE. These breakdowns apply to the category entitled "Other and miscellaneous manufacturing" as published in *Growth Patterns in Employment by County*. The special breakdowns were needed because they include such important industries as "Primary metals," "Fabricated metal products," and others. Even with this aid, however, Category No. 16, "Manufacturing, n.e.c." in our standard list is undesirably large; unfortunately, it includes industries of considerable importance, such as rubber and rubber products, and stone, clay, and glass.

It should be noted that differences in sources of basic data mentioned above could give rise to a conceptual problem. Thus, data for the period 1950-1960, although drawn here from the OBE study as indicated, have their original source in Census of Population reports, in which employment is allocated to the place of residence of the employee. Data for the 1959-1964 period, however, are drawn from sources that assign employment to the place of work. In working with data for corporate cities or for individual counties, such a disjuncture may be serious, or even decisive, but it may be considered to be of relatively small importance in dealing with metropolitan areas embracing counties, as is the case here. That judgment is used widely as a working rule by regional analysts, despite the extensive commuting distances often traveled by the employee. Supplementary data for the 1964-1966 period contained in the third article are based on the place-of-work criterion, as in the case of the 1959-1964 period.

Meaning of Totals. In addition to the industry and service categories (which constitute the main focus of the study) the various tables also show a final line for totals, usually in the form of "Total of covered industries." In interpreting such totals, certain basic points

should be kept in mind: (1) "Covered employment" is not identical with "Total employment"; (2) for relative growth indicators, although not for percent change data, the relative sizes of the cities represent important underlying influences. Because of the nature of the computation, a relative growth indicator for a given industry in a large city may be larger (either plus or minus) than for a smaller city. At the same time, however, the variation among industries in this respect is so large as to render undesirable, and probably statistically indefensible, the use of any standard adjustment factor; and (3) statistical problems arising from levels of aggregation occur at certain points in the use of data for "totals" shown here.

The last-mentioned point is seen most clearly by reference to the final line of Table I, with accompanying footnote. It might be thought that the computation of total relative growth indicators could be done *either* by following through the computations in a horizontal direction, exactly as was done for the individual industries, *or* by summing the relative growth indicators for the individual industries as shown in the final column. In fact, the results obtained by the two methods will, and should, differ because the degree of aggregation has an effect on the summation of relative growth indicators. That, in turn, goes back to differences in industry mix between the city under consideration and the standard of comparison, whether the latter is the United States total or the aggregate of 13 cities. The method of obtaining the total of relative growth indicators, as shown in the lower right corner of Tables I-a-c, is the same as that used in *Growth Patterns in Employment by County;* that is, the total is obtained by a vertical addition of the individual industry entries rather than by the horizontal route of aggregate percentage computations.

APPENDIX TABLE I

Identification of Covered Industries by Standard Industrial Classification Code

Industry	SIC Code
1. Mining	10-14
2. Contract construction	15-17
3. Food and kindred products	20
4. Textile mill products	22
5. Apparel	23
6. Lumber, wood products, furniture	24-25
7. Paper and allied products	26
8. Printing and publishing	27
9. Chemicals and allied products	28
10. Petroleum and coal products	29
11. Machinery	35-36
12. Motor vehicles and equipment	371
13. Aircraft and parts, ships, etc.	37 (except 371)
14. Primary metals	33
15. Fabricated metal products	34
16. Manufacturing, n.e.c.	21, 30-32, 38-39
17. Railroads and railway express	40
18. Trucking and warehousing	42
19. Transportation other than rail and trucking	41, 44-47
20. Communications	48
21. Utilities and sanitary service	49
22. Wholesale trade	50
23. Retail trade	52-59
24. Finance, insurance, and real estate	60-67
25. Personal services including hotels	70, 72
26. Business and repair services	73, 75-76
27. Entertainment, recreation services	78-79
28. Professional services	80-82, 84, 86, 89

APPENDIX TABLE II

Components of Percent Changes in Total Nonagricultural Employment Cleveland, Pittsburgh, and Cincinnati 1950-1960

	Changes Related to: National Growth*	Industry Mix	Regional Share†	Total Change
Cleveland	+22.9%	+1.6%	— 9.0%	+15.5%
Pittsburgh	+22.9	—2.0	—17.4	+ 3.5
Cincinnati	+22.9	+0.2	— 4.9	+18.2

*Total employment gain for United States, all nonagricultural industries; when combined with change in components shown in next two columns, the result is "total change" shown in final column.

†Same concept as "relative growth indicator" used in this study. Total United States change is the standard of reference.

Sources: Same as Table I, main text

A NOTE ON BUSINESS INVENTORIES

Progressive strengthening of overall economic activity since the first quarter of 1967 can be traced in part to the diminishing impact of the inventory adjustment. That the inventory adjustment was not more serious was largely due to the fact that final sales[1] expanded substantially. The marked growth in total final sales first helped to prevent a cumulative decline in economic activity, and then enabled the economy to move toward achieving better balance between inventories and sales.

As a case in point, in May 1967, the ratio of business inventories to sales began to edge downward, after increasing appreciably beginning in the summer of 1966. Even with that improvement, however, inventory-sales ratios at the end of September 1967 were still generally higher than at any time since early 1961. This suggests that, at the end of September, excess stocks remained in some parts of the economy. The purpose of this article is to examine the nature of the inventory adjustment, to review the recent status of business inventories, and to point out possible areas of excess stocks.

[1] Final sales equals Gross National Product less inventory investment.

INVENTORIES AND SALES

As shown in the top panel of Chart 1, additions to business inventories (or inventory investment) increased sharply during 1966, and reached a record high in the fourth quarter. Some of the accelerated buildup in inventories reflected continued growth in new orders and backlogs of defense products and capital goods. Nevertheless, it is apparent that some of the inventory buildup was involuntary, as business sales consistently fell short of expectations.

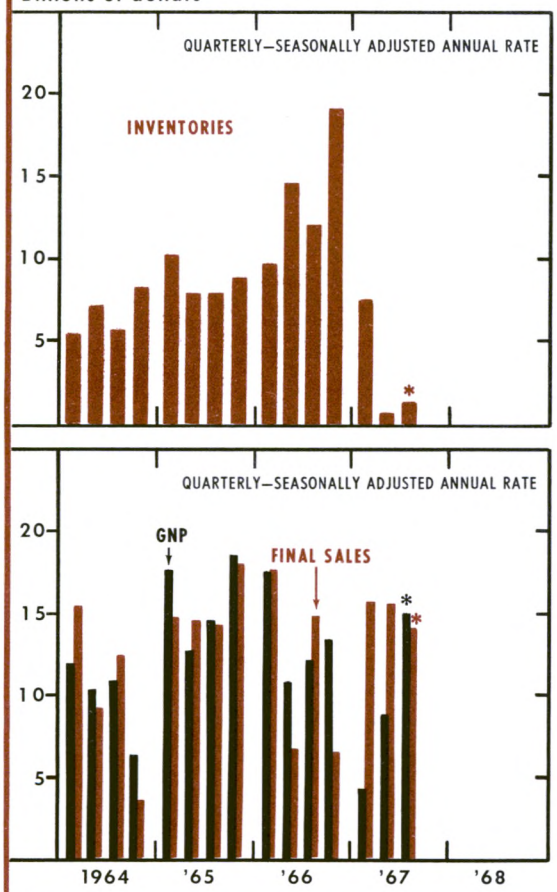
Chart 2 shows that manufacturers' sales (shipments) rose little between the second quarter of 1966 and the second quarter of 1967. As anticipated sales consistently fell short of expectations, the spread between actual and anticipated sales widened progressively through the second quarter of 1967.[2] Incentives for holding inventories appeared to lessen from the second quarter of 1966 through the second quarter of 1967. Industrial materials prices had been slipping since the spring of 1966; production lead times were steadily improving throughout 1966 and early 1967; and backlogs of unfilled

[2] See "Trends in Prices, Production, and Inventories," *Economic Review*, Federal Reserve Bank of Cleveland, Cleveland, Ohio, August, 1967.

Chart 1.

QUARTERLY CHANGES in NONFARM INVENTORIES, GNP, and FINAL SALES

Billions of dollars



*Preliminary.

Source of data: U.S. Department of Commerce

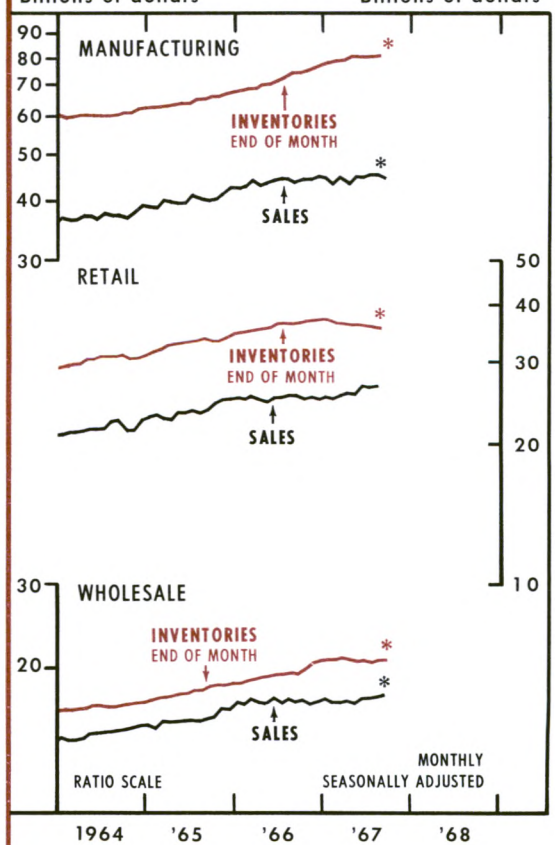
orders, especially for home goods, machinery and equipment, and materials and supplies, began to experience a declining trend in late 1966.

The surge of inventory investment to a $19 billion annual rate (GNP basis) in the fourth quarter of 1966 set the stage for a sharp reduction in the rate of inventory investment during 1967. Additions to nonfarm inventories in the first quarter of 1967 totaled $7.3 billion at an annual rate, an $11.7 billion decline in inventory spending from the previous quarter. Additions to inventories in the second quarter fell to a negligible $0.6 billion, or a $6.7 billion decline in inventory spending. The $18.4 billion turnaround in inventory spending during the first half of 1967 was unprecedented for any half-year period and was a major factor in the slower rate of growth of GNP. On the other hand, as the reduction in inventory

Chart 2.

BUSINESS INVENTORIES and SALES

Billions of dollars — Billions of dollars



*Preliminary.

Source of data: U.S. Department of Commerce

spending became smaller, the gain in GNP became larger. Thus, as shown in the bottom panel of Chart 1, the gain in GNP during the first quarter of 1967 amounted to about $4 billion at an annual rate, while the gain in the second quarter amounted to nearly $9 billion.

A sharp curtailment in inventory investment is usually accompanied by cutbacks in new orders and production, which ultimately result in a cumulative decline in economic activity. However, in the recent period, total final sales continued to grow and thereby lessened the impact of the inventory adjustment. Expansionary monetary and fiscal policies stimulated aggregate demand, and helped to boost the growth of final sales in the first quarter of 1967 to an annual rate of about 8 percent. Final sales were sustained at nearly the same rate during the second quarter.

NATURE OF THE ADJUSTMENT

The adjustment in inventories during the first half of 1967 took the form of a reduced rate of buildup in total business inventories during the first quarter, and an even smaller buildup during the second quarter. As shown in Chart 2, most of the inventory correction occurred in the trade sector, at both the retail and wholesale levels where stocks were actually reduced beginning in early 1967 in response to lagging sales. Retailers started to reduce stocks of both durable and nondurable goods in January, with a large part of the reduction accounted for by automobiles. In the case of wholesalers, the liquidation of stocks was concentrated in the second quarter. Manufacturers, who account for about 60 percent of total business stocks, continued to accumulate inventories at a reduced rate until last May, and then actually cut into stocks in June. In short, manufacturers attempted to bring inventories and sales into better balance by smaller additions to inventories rather than by outright liquidation of stocks, as was the case in retail and wholesale trade.

INVENTORIES IN RELATION TO SALES

Taken alone, the stock of goods on hand is not necessarily a meaningful or reliable indicator of the current or future behavior of inventories. Inventory decisions are the result of several factors, including prices, order backlogs, and current and anticipated output and sales, among others. Businessmen generally respond to rising sales by accelerating orders and production. If sales rise faster than expected, inventory investment will lag behind sales; but, if sales rise less than expected, inventories will accumulate, prompting a reduction in orders and production until the desired relationship between inventories and sales is restored. For analytical purposes, it is helpful to consider the relationship of inventories to actual and anticipated sales — the inventory-sales ratio.

Beginning in the summer of 1966, inventory-sales ratios for both manufacturing and trade increased sharply, due largely to sluggish sales. Despite the curtailment in the buildup of business inventories in early 1967, the overall inventory-sales ratio continued to rise until April 1967. Since April, the ratio has retreated, but recently was still at a level well above mid-1966, when excesses first became apparent. It should be noted that a high

ratio does not necessarily signify imbalance in the relationship between inventories and sales. For one thing, a high ratio may reflect a relatively large proportion of stocks in "inventory-intensive" industries that have longer production lead times than most other industries; i.e., "defense" and "machinery and equipment." This was exactly the case late last summer when the inventory-sales ratio for defense products in September was about 3.2 months of shipments versus 1.83 months for all manufacturing.

Even allowing for defense products, however, recent inventory-sales ratios in manufacturing were still higher than the ratios that existed in the summer of 1966 (see Chart 3). In fact, ratios for several key industries, at last report, were higher than in any business expansion (some ratios were at the "high" end of a range that has prevailed during the past ten years). In those instances, inventories still seemed to be out of balance relative to sales.

A different pattern emerges in the retail area. As shown in Chart 3, stock-sales ratios have declined steadily since last February, and at the end of August were lower than at any time in the current business expansion, or, for that matter, in recent experience. The bulk of the inventory adjustment occurred in auto stocks, but stock-sales ratios for furniture and appliances also tended downward and by the end of August were at the lowest levels in the past decade (not shown in Chart 3).

While stock-sales ratios in the wholesale trade area have moved down since last March, at the end of September, they were still somewhat above year-earlier levels, particularly in the area of durable goods.

ARE INVENTORIES EXCESSIVE?

Some improvement in the present status of inventories is implied by the retreat of inventory-sales ratios from the "highs" of last spring. However, inventory-sales relationships over time are not invariant, and tend to undergo fundamental adjustment due to a number of influences. For example, the inventory-sales ratio may move downward because of more efficient use of inventories, which in turn reflects new production techniques, improved warehousing facilities, a greater variety of modes of transportation, increased use of computers, and more profitable alternative uses of funds. On the other hand, factors such as the introduction of new products and new styles may tend to push the ratio upward.

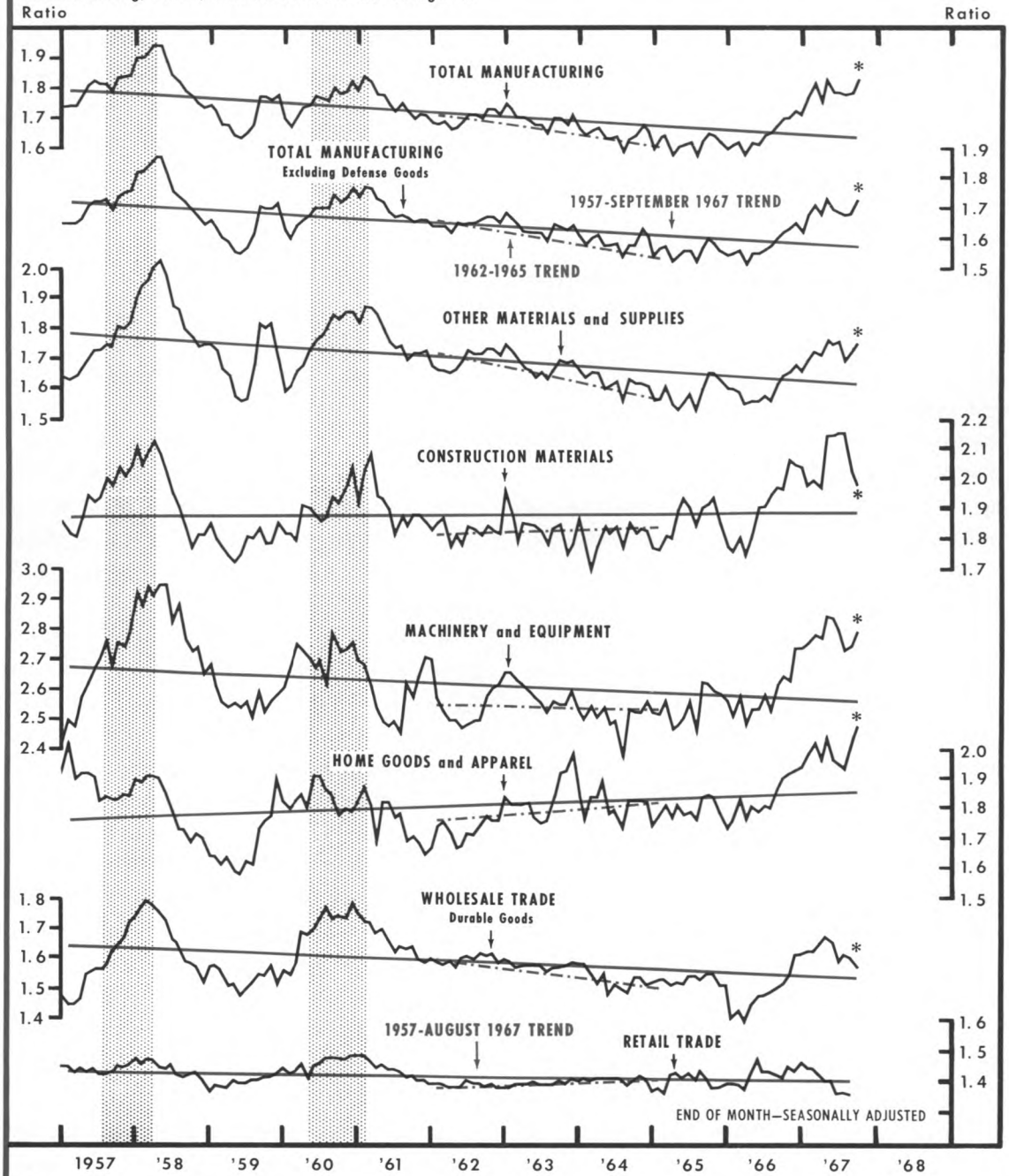
An average relationship of stocks to sales over a period of years is useful in evaluating the status of inventories at any given time. Sizable deviations above and below the average relationship can be considered as an imbalance between inventories and sales. Short-run deviations above trend may reflect influences such as rising prices or expected material shortages, while deviations below trend could reflect temporarily conservative inventory policies. In either case, as such conditions abate, inventories tend to be brought back into line with average relationships.

Chart 3 shows actual inventory-sales values and two trend lines (average relationships); the trend lines are fitted to data for 1957-1967 and for 1962-1965. For analytical purposes, use of a longer-term average relationship is preferable. However, an average

Chart 3.

INVENTORY—SALES RATIOS

Manufacturing, Trade, and Selected Market Categories



*Preliminary.

Sources of data: U.S. Department of Commerce and Federal Reserve Bank of Cleveland

relationship for a shorter period is helpful in evaluating a particular near-term situation, in this case the early years of the current expansion. The year 1961 is excluded from the shorter period because that year was biased by the 1960-1961 business recession, and 1966 is excluded because that year was biased by an "overheated" economy.

Interestingly, the same conclusion about inventory-sales relationships can be derived from either trend line; namely, that inventory-sales ratios at the end of September (or August, where relevant) clearly were well above what would be expected on the basis of trend. It is apparent from Chart 3 that the trend lines (for both time periods) for manufacturing, wholesale durable goods, and retail trade all tend downward, implying various degrees of progress toward more efficient use of inventories relative to sales. (The trend for retail trade is tilted only slightly downward, since retailers made significant improvements in operations in earlier periods not shown in the chart.) Within manufacturing, both trend lines more or less move downward for all market groupings shown in the chart, except for "home goods and apparel" and "construction materials." Each pair of trend lines (1957-1967 and 1962-1965) for the individual market groupings moves in essentially the same direction, with the exception of "construction materials." With reference to the slope of the lines, however, there is obvious variation in the case of both total manufacturing and wholesale durable goods.

Chart 3 also shows that the deviation of actual inventory-sales values from trend is most marked in the manufacturing sector. The deviation in total manufacturing grew progressively larger between the summer of 1966 and the spring of 1967, then declined, but increased again in September; the deviation thus far in 1967 is greater than for any period since 1958. For manufacturing, excluding defense, the deviation from trend is similar to that for total manufacturing. Based on the difference between actual values and values of the trend lines fitted for 1957-1967, the excess of inventories in manufacturing (excluding defense) amounted to about $6.1 billion in September 1967. If the trend line for 1962-1965 were extrapolated, the difference between actual and trend values would be even greater. It should be noted, however, that higher stock-sales ratios than prevailed during 1962-1965 may be warranted in the current economic environment, in view of rising output and increasing inflationary pressures.

At the end of September, based on actual and trend values for 1957-1967, the bulk of the excess in manufacturing stocks was concentrated in "construction materials," "machinery and equipment," and "other materials and supplies." Inventories held by producers of "construction materials" (such as paint, paving materials, building materials and certain stone, clay, and glass products) appeared to be excessive by about $0.3 billion, against total stocks of about $6.3 billion in that category. The excess, which was the largest for any time in recent experience, developed during 1966 and widened in 1967 because of declining sales. The apparent excess of inventories held by producers of "machinery and equipment" amounted to nearly $1.1 billion at the end of September, against total stocks of about $13.2 billion in that category.

That apparent excess is the largest since early 1958, but prospects for reduction appear favorable. The gradual rise in new orders since last February, following reinstatement of the investment tax credit, should provide support for renewed expansion of sales of machinery and equipment, which in turn will help to absorb some of the excess stocks.

The actual stock-sales ratio for "other materials and supplies" (such as primary metals, certain fabricated metal products, containers, machine tools, and electrical apparatus) was also higher than the trend value for 1957-1967. While considerable progress was made toward bringing inventories of these products into line with sales, at the end of September, the inventory excess amounted to about $2.5 billion. Stock-sales ratios for "home goods and apparel" (such as household appliances, floor coverings and clothing) also were above trend values. As shown in Chart 3, trend lines (for both 1957-1967 and 1962-1965) for "home goods and apparel" slope upward, reflecting efforts by retailers and wholesalers to have manufacturers carry a larger share of the inventory. Nevertheless, at the end of September 1967, the actual stock-sales ratio was considerably above the trend value for 1957-1967.

Liquidation of inventories and renewed strength in sales at the retail level have markedly reduced stock-sales ratios since last April. Through August, actual values were substantially below 1957-1967 trend values, thus supporting the view that the adjustment of inventories at the retail level has been completed. At the wholesale level, the actual stock-sales ratio for durable goods, was considerably above trend until last spring, but was then trimmed sharply; by the end of September that ratio was reasonably consistent with trend values.

CONCLUDING COMMENTS

Earlier this year, it was suggested by some observers that the inventory adjustment would cause a cumulative decline in overall economic activity. Although growth in GNP slowed during the first half of 1967, the forward momentum of the economy was maintained by a sustained rise in final sales, which in large part reflected the contribution of expansionary monetary and fiscal policy. Even with the recent adjustment in inventories, however, actual ratios of inventories-to-sales at the end of September (or August, where relevant) were still high compared with trend values. There are various ways by which excessive stocks could be adjusted further, such as by reducing rates of inventory accumulation, by liquidating stocks, by an increase in sales, or by some combination of these. Whatever the case, the relationship of inventories-to-sales in the months ahead will largely be determined by the actual course of economic activity, as well as expectations regarding what that course might be.

Fourth Federal Reserve District