by LOWELL D. ASHBY

Growth Patterns in Employment by County, 1940-1950 and 1950-1960

A New Set of Publications

THE Office of Business Economics has just released the first two of an eight-volume series of publications that identify and measure components of employment change from 1940 to 1950 and from 1950 to 1960 in each of 32 industries in each county of the Nation. Volume 1 covers the New England region and its six States and 67 counties. Volume 2 is concerned with the Mideast region together with its five States, its 177 counties, and the District of Columbia. Each volume describes analytical methods and data sources and contains charts and tables for each county and State in the region.

The two volumes just released are:

Growth Patterns in Employment by County, 1940–1950 and 1950–1960

Volume 1, New England, $0.45

Volume 2, Mideast, $0.65

They are now for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, and at all U.S. Department of Commerce Field Offices. The remaining six volumes will be announced in the SURVEY when available.

Components of change

An example of the information provided in the publications is given in table 1. This shows employment in each of 32 industries for the New England region for 1940, 1950, and 1960 and, in addition, the components of employment change in the two periods 1940–50 and 1950–60.[1]

The components of change are given in columns D, E, and F for 1940–50 and in columns J, K, and L for 1950–60 and consist of the following:

(1) *National growth effect* (columns D and J)—the change due to an area's participation in the overall national economic growth. All areas in the Nation share a common factor in that they are part of the same expanding national economy.

(2) *Industrial mix effect* (columns E and K)—the change due to the type of industry in which the area specializes. For example, a region where the work force in 1950 was predominantly agricultural participated in the long-term national decline in agricultural employment. Conversely, a region heavily committed to the electronics industry received a lift from its national expansion.

(3) *Regional share effect* (columns F and L)—the change due to the fact that the growth of the various industries within a region may differ from the national growth rates for the same industries. The regional share effect shows whether the employment growth in local industries has lagged behind or outpaced that in the same industries in the Nation as a whole.

Each of the effects defined above can be totaled for all industries; the resultant totals for each component can then be combined to give the total employment change for an area. The results for New England are shown in the "Total" line of table 1.

The "total net relative change" for an area over a period of time is the sum of the total industrial mix component and the total regional share component. If this sum is positive, there has been an increase, and if negative, a decrease in the percent of the Nation's total employment located in the area.

Since the industrial mix and the regional share components of change are both present, they may either reinforce or offset each other. For example, an area may have an excellent combination of rapid growth industries, but because of obsolete capital equipment, inadequate accessibility to markets, or other conditions, employment growth may lag behind the national pace in these industries. Thus, the boost from a favorable industrial mix can be canceled by the drag of a declining regional share.

Conversely, through aggressive leadership or fortunate geographic location, an area where the industrial mix is unfavorable may exceed national growth rates in its various industries. Thus, the potential handicap of slow growth industries can be overcome by better-than-average growth in these industries.

Opposing and reinforcing tendencies

Summary results—taken from the "total" line—for the major regions of the United States are presented in table 2. They show that in most regions the industrial mix and the regional share components have tended to pull in opposite directions over both decades. In the New England, Mideast, and Great Lakes regions, a favorable industrial mix tended to boost employment, while all three sustained preponderant losses in their shares of the several industries. In the Southeast, Southwest, and Rocky Mountain

[1] The method by which the components of change are computed was explained in "The Geographical Redistribution of Employment: An Examination of the Elements of Change," SURVEY OF CURRENT BUSINESS, October 1964. A review of these computations in terms of data for New England for the period 1940–50 is contained in an appendix on page 13.

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regions, an opposite situation obtained. Here, an unfavorable industrial mix—due mainly to heavy dependence upon agriculture and mining—tended to reduce employment growth. However, this negative tendency was partially overcome by employment growth rates that exceeded national rates in most industries.

In the agriculturally dominated Plains States, both the industrial mix and the regional share components subtracted

Table 1.—Employment and Components of Employment Change

Industry	New England											
	Employment in			Components of employment change								
				1940–1950					1950–1960			
	1940	1950	1960	Changes related to			Total change	Octant code	Changes related to			Total change	Octant code
				National growth	Industrial mix	Regional share			National growth	Industrial mix	Regional share		
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(I)	(J)	(K)	(L)	(M)	(O)
1 Agriculture	149,942	128,659	84,273	39,981	−66,889	5,625	−21,283	6	19,918	−69,408	5,104	−44,386	6
2 Forestry and fisheries	11,267	14,279	8,616	3,004	−1,199	1,207	3,012	3	2,211	−5,850	−2,023	−5,662	8
3 Mining	4,633	4,823	4,005	1,235	−1,173	127	189	6	747	−2,180	616	−817	6
4 Contract construction	141,608	202,350	214,875	37,759	57,316	−34,333	60,742	4	31,326	−10,331	−8,470	12,525	8
5 Food and kindred products mfg	58,596	66,654	87,880	15,624	703	−8,269	8,058	5	10,319	8,936	1,972	21,227	2
6 Textile mill products mfg	257,415	260,563	125,406	68,638	−48,864	−16,626	3,148	8	40,338	−100,474	−75,021	−135,157	8
7 Apparel mfg	66,503	76,959	83,788	17,732	4,286	−11,562	10,456	5	11,914	−5,025	−60	6,829	8
8 Lumber, wood products, furniture mfg	52,843	62,907	53,358	14,090	13	−4,039	10,064	5	9,739	−16,236	−3,052	−9,549	8
9 Printing and publishing mfg	46,756	58,350	77,939	12,467	4,020	−4,893	11,594	5	9,033	10,475	81	19,589	2
10 Chemicals and allied products mfg	23,862	30,947	34,590	6,363	5,520	−4,798	7,085	4	4,791	4,841	−5,989	3,643	5
11 Electrical and other machinery mfg	142,691	243,247	329,576	38,047	96,592	−34,084	100,555	4	37,657	75,674	−27,002	86,329	4
12 Motor vehicles and equipment mfg	6,332	11,132	7,451	1,688	1,554	1,557	4,799	1	1,723	−2,076	−3,329	−3,682	7
13 Other transportation equipment mfg	40,260	47,366	111,772	10,735	12,292	−15,921	7,106	5	7,333	41,136	15,937	64,406	2
14 Other and miscellaneous mfg	474,531	533,721	567,408	126,530	29,516	−96,856	59,190	5	82,626	17,427	−66,365	33,688	5
15 Railroads and railway express	46,885	50,315	28,467	12,502	−2,144	−6,928	3,430	7	7,789	−23,986	−5,651	−21,848	8
16 Trucking and warehousing	31,953	41,155	45,540	8,520	3,886	−3,204	9,202	4	6,371	5,857	−7,844	4,384	5
17 Other transportation	31,951	46,347	40,178	8,519	10,365	−4,489	14,395	4	7,175	−5,902	−7,442	−6,169	7
18 Communications	29,807	46,869	52,889	7,948	15,916	−6,802	17,062	4	7,256	−5	−1,231	6,020	7
19 Utilities and sanitary service	39,149	50,368	50,650	10,439	6,881	−6,101	11,219	4	7,798	−528	−6,988	282	7
20 Wholesale trade	75,646	115,897	122,083	20,170	28,139	−8,058	40,251	4	17,942	−4,424	−7,332	6,186	7
21 Food and dairy products stores	111,030	114,587	108,334	29,605	−12,583	−13,466	3,556	7	17,739	−20,014	−3,978	−6,253	8
22 Eating and drinking places	69,321	93,812	94,736	18,484	16,916	−10,909	24,491	4	14,523	−8,490	−5,109	924	8
23 Other retail trade	262,342	327,741	347,947	69,951	31,623	−36,176	65,398	5	50,738	6,277	−36,809	20,206	5
24 Finance, insurance, and real estate	110,722	140,470	183,819	29,523	4,435	−4,210	29,748	4	21,746	34,856	−13,253	43,349	4
25 Hotels and other personal services	109,569	110,678	102,634	29,216	−18,056	−10,050	1,110	8	17,134	−12,381	−12,797	−8,044	7
26 Private Households	148,990	80,786	79,040	39,727	−84,169	−23,762	−68,204	8	12,507	1,162	−15,415	−1,746	5
27 Business and repair services	56,739	80,620	91,017	15,129	14,033	−5,281	23,881	4	12,481	5,782	−7,866	10,397	5
28 Entertainment, recreation services	21,880	25,460	23,109	5,834	−446	−1,808	3,580	7	3,941	−3,522	−2,771	−2,352	8
29 Medical, other professional services	262,463	343,769	514,997	69,984	45,595	−34,273	81,306	4	53,219	146,041	−28,032	171,228	4
30 Public administration	107,807	156,586	179,114	28,746	46,034	−26,000	48,780	4	24,241	18,638	−20,352	22,527	5
31 Armed forces	13,200	49,865	103,291	3,520	27,590	5,555	36,665	2	7,720	26,702	19,004	53,426	2
32 Industry not reported	53,434	43,893	179,156	14,248	−2,488	−21,301	−9,541	7	6,795	85,186	43,282	135,263	2
Total	**3,060,127**	**3,661,175**	**4,137,938**	**815,958**	**225,214**	**−440,128**	**601,044**	**5**	**566,790**	**198,158**	**−288,185**	**476,763**	**5**
				[Total net relative change (H) −214,914 (Sum of totals Cols. E and F)]					[Total net relative change (N) −90,027 (Sum of totals Cols. K and L)]				

Source: U.S. Department of Commerce, Office of Business Economics.

Table 2.—Employment and Components of Employment Change, Regions and States, 1940–50 and 1950–60 [1]

[Thousands of employees]

	Employment			1940–50						1950–60					
				Changes related to [2]			Total change [3]	Net relative change [4]	Octant code	Changes related to [2]			Total change [3]	Net relative change [4]	Octant code
	1940	1950	1960	National growth	Industrial mix	Regional share				National growth	Industrial mix	Regional share			
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)
United States	**45,375.8**	**57,474.9**	**66,372.6**	**12,099.1**	**0.0**	**0.0**	**12,099.1**	**0.0**	**1**	**8,897.7**	**0.0**	**0.0**	**8,897.7**	**0.0**	**1**
New England	3,060.1	3,661.2	4,137.9	816.0	225.2	−440.1	601.0	−214.9	5	566.8	198.2	−288.2	476.8	−90.0	5
Mideast	10,876.2	13,363.2	14,892.1	2,900.0	821.6	−1,234.6	2,487.0	−413.0	5	2,068.8	758.4	−1,298.3	1,528.9	−539.9	5
Great Lakes	9,256.8	11,931.3	13,403.4	2,468.3	507.1	−300.8	2,674.5	206.3	4	1,847.1	277.1	−652.1	1,472.1	−375.0	5
Plains	4,513.5	5,378.9	5,683.3	1,203.5	−316.6	−21.5	865.4	−338.1	8	832.7	−320.9	−207.4	304.4	−528.3	8
Southeast	9,878.3	11,913.4	13,414.1	2,634.0	−1,299.7	700.8	2,035.1	−598.9	6	1,844.3	−1,062.4	718.8	1,500.7	−343.6	6
Southwest	3,087.5	4,091.5	5,055.6	823.3	−220.7	401.4	1,003.9	180.7	3	633.4	−100.8	431.5	964.1	330.7	3
Rocky Mountain	929.4	1,264.1	1,558.3	247.8	−33.1	120.0	334.7	86.9	3	195.7	−64.6	163.1	294.2	98.5	3
Far West	3,773.9	5,871.3	8,227.9	1,006.3	316.2	774.9	2,097.4	1,091.1	1	908.9	315.0	1,132.6	2,356.6	1,447.6	1

[1] Derivation of each component is explained in the text. Detail will not add to totals because of rounding.

[2] Components are the result of summation across analytical results for each of 32 industrial categories. Data are from the U.S. Census of Population.

[3] Sum of components D, E, and F for 1940–50 and J, K, and L for 1950–60.

[4] Sum of columns E and F for 1940–50 and K and L for 1950–60.

Source: U.S. Department of Commerce, Office of Business Economics.

from employment gains. In contrast, both factors contributed to the rapid expansion of employment in the Far West.

The result of the industrial mix and regional share influences was that four regions (New England, Mideast, Plains, and Southeast) ended each decade with a smaller portion of the Nation's total employment, while three (Rocky Mountain, Southwest, and Far West) acquired a larger share. The share of the Great Lakes region first increased and then decreased.

Charting the elements of change

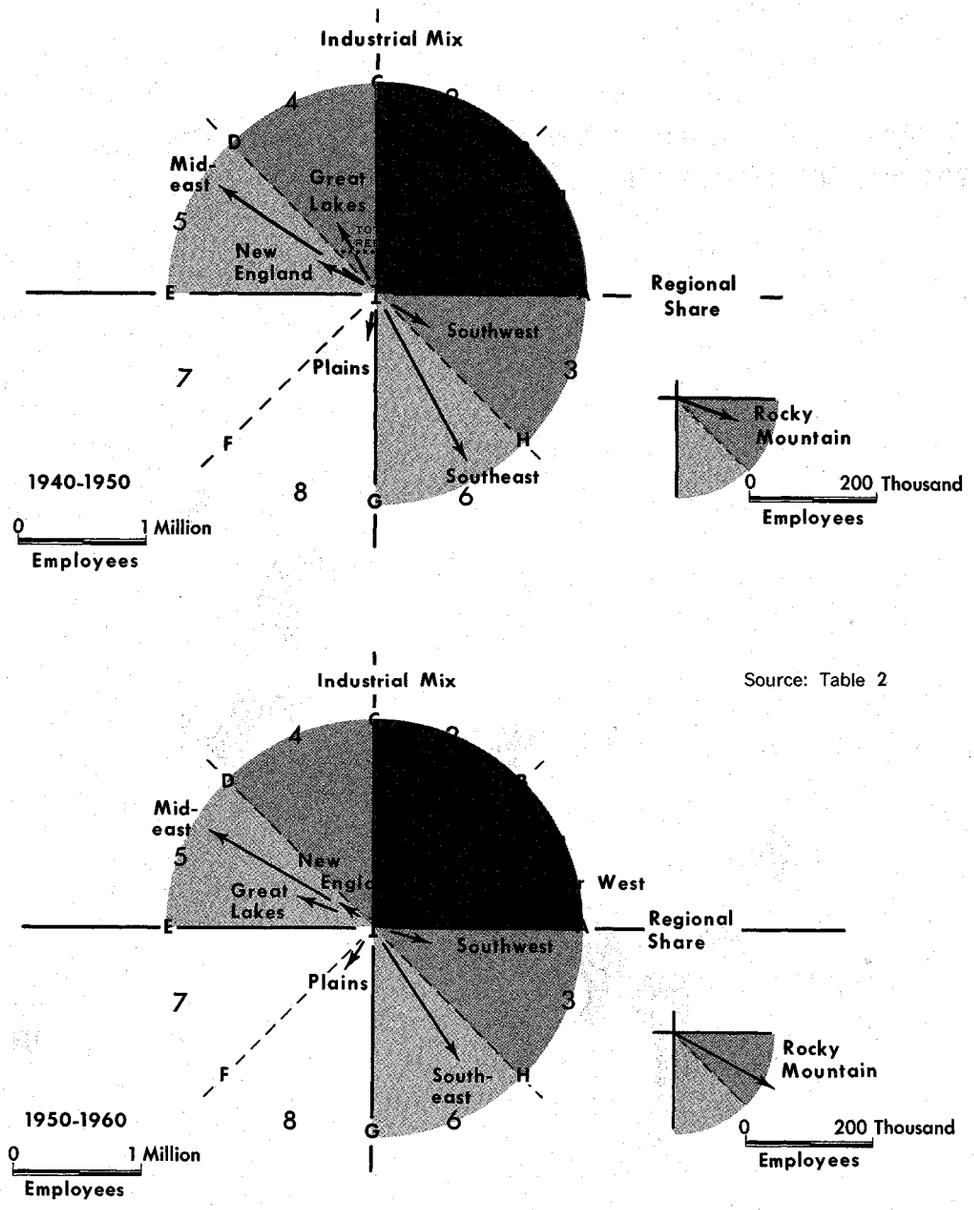
An advantage of the technique used in constructing the tables is that whether the three change components are computed directly for a given region or whether they are summed from the computed components for its subareas, the results are identical. This additivity industry by industry through all levels of geographic area grouping may also be illustrated graphically as in chart 8. The upper panel of the chart refers to the period 1940–50 and the lower panel refers to the period 1950–60. Points to the right and left of the vertical axis in each panel represent positive and negative regional-share components, and points above and below the horizontal axis represent positive and negative industrial mix components respectively. The intersection of the two major axis is a reference point (at zero, zero) that would represent a region with zero regional share and zero industrial mix components. The area used as a standard-of-growth reference (in the present publications series, the United States) is always represented by this point.

In addition to the basic reference point, there are points (tips of arrows) in chart 8 for each of the eight regional divisions of the Nation. Each regional point conveys three of the analytical concepts defined above. For example, the point corresponding to New England for the period 1940 to 1950 shows that the total regional-share component is negative (−440.1 thousand) and that the total industrial-mix component is positive (225.2 thousand). As explained below, the sum of these two, the total net relative change (−214.9 thousand) also can be found as a measurable distance on the chart.

In addition to the main axes, chart 8 contains two sloping 45-degree lines. The line sloping upward from left to right (labeled F–I–B) connects points where the regional-share component is equal to the industrial mix component. The line sloping downward from left to right (labeled D–I–H) locates points where the absolute values of share and mix components are equal but of opposite sign. Points on the latter line would represent regions whose net relative change is zero. Thus, points above and to the right of this line have positive net relative changes while those below and to the left have negative net relative changes. Also, for any geographical area the horizontal (or vertical) distance of a point from the D–I–H line is a measure of the total net relative

CHART 8

Industrial Mix, Regional Share, and Net Relative Change Components by Regions, 1940-50 and 1950-60



Source: Table 2

U.S. Department of Commerce, Office of Business Economics

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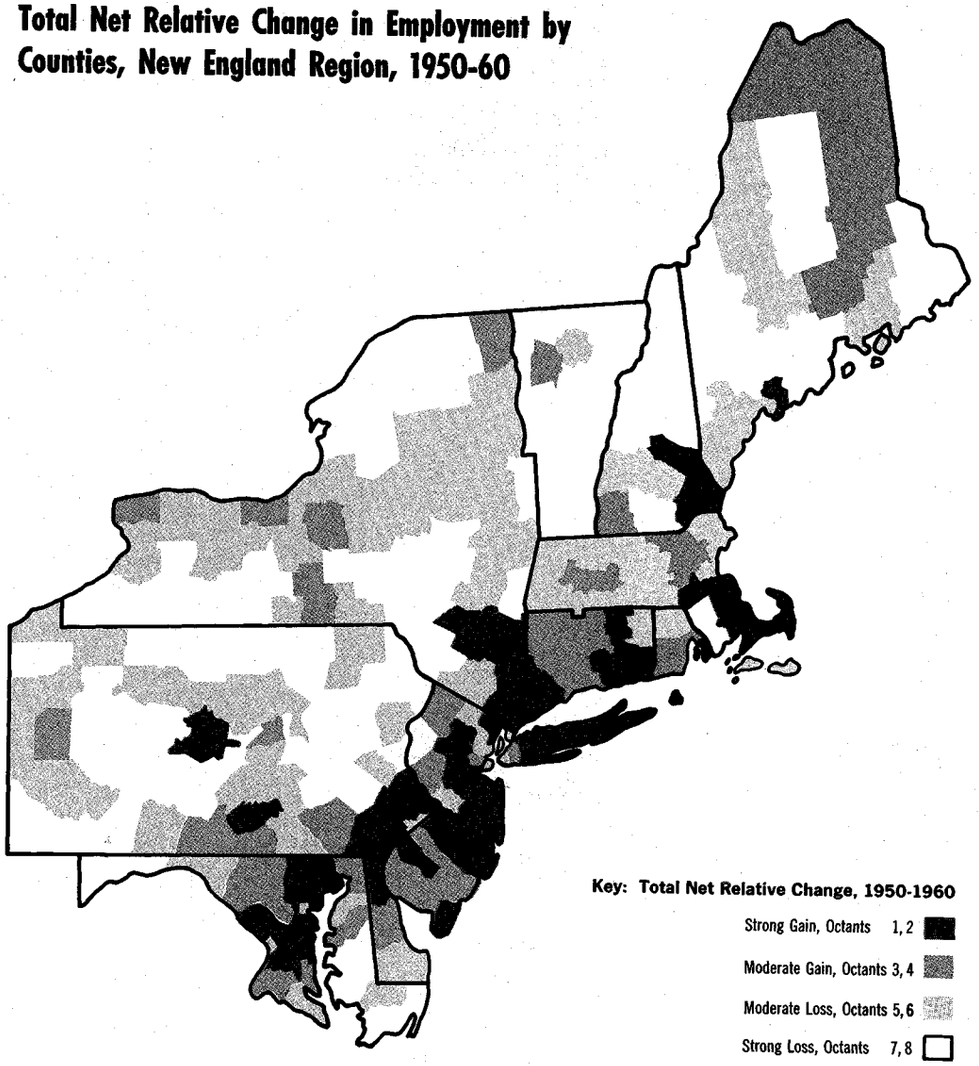
change for the area. For example, the net relative change for the Far West in the 1940–50 period (upper panel, chart 8) is represented by a horizontal dotted line with a length extending 1,091.1 thousand to the right of (that is, in a positive direction from) the D–I–H line.

The exact position of a particular area can be indicated only by complete specification of its regional share and industrial mix coordinates as in chart 8. For many purposes, however, such detailed information is not needed. Instead, a region can be classified into one of a limited number of categories related to its general growth pattern. This is the purpose of the single digit codes shown in columns I and O of tables 1 and 2 for the period 1940–50 and 1950–60, respectively. As indicated in chart 8, every major regional point lies in one of eight designated divisions (octants). If a point falls on a dividing line, the assigned code is the letter identifying the line. Letter designations do not happen to occur for any of the eight major regions in chart 8. However, the Nation itself (as the reference region) is represented by a point common to all the dividing lines and the code letter for this point is "I."

Experience has shown the octant codes to be useful shorthand expressions for quickly noting the major characteristics of an area's employment growth pattern.

CHART 9

Total Net Relative Change in Employment by Counties, New England Region, 1950-60



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Maps summarize growth patterns

The foregoing octant system obviously can be shown in systematically shaded maps. Chart 9 is such a map for the period 1950–60 for New England and the Mideast regions combined. This map area includes eleven States and the District of Columbia. The States, in turn, comprise 244 counties.

The shading key in chart 9 suggests a general relationship between the strength of an area's total net relative change in employment and its octant. Those areas whose total net relative change in employment—expressed as a percent of base year employment—was strongest tend to fall in octants 1 and 2. Those with the largest declines tend to appear in octants 7 and 8. Areas with moderate gains fall in octants 3 and 4 and those with moderate losses in 5 and 6. In the case of the eight regions of the United States, as presented in table 2, the relationship holds without exception both for the 1940's and the 1950's. If the same test is applied to successively smaller areas, some blurring of the relationship occurs. That is, there are some counties whose position in the four groups of octants in chart 9 is inconsistent with the strength of their employment change. These, however, are exceptions to a generally valid relationship.

The map illustrates the inadequacy of broad generalizations based on national, regional, and even State data. Table 2 has shown that the portions of the Nation's employment located in New England and in the Mideast decreased in the period 1950–60. But within New England, both New Hampshire's and Connecticut's portions of the Nation's total increased, and within the Mideast, similar increases occurred in New Jersey, Delaware, and Maryland.

As indicated by the map, employment growth performance also varied greatly within States. Although Pennsylvania experienced a net relative loss, 12 of its counties had net relative gains.

The main feature of the current publication series is that it focuses on counties in terms of their unique employment growth characteristics. The series is designed as a reference aid to businessmen, market analysts, econo-

mists, regional planners, State development officials, and others concerned with the character of economic change in local areas.

Appendix: Illustrative Computations for New England

Data	Employment (in thousands)		Percent change
	1940	1950	1940–1950
United States, total employment	45,375.8	57,474.9	26.664
United States, contract construction employment	2,068.5	3,457.2	67.139
New England, contract construction employment	141.6	202.4	42.894

Computations for contract construction:

National growth component (table 1, Col. D) (141.6)(0.26664)	=	37.8 thousand
Industrial mix component (table 1, Col. E) (141.6)(0.67139–0.26664=0.40475)	=	57.3 thousand
Regional share component (table 1, Col. F) (141.6)(0.42894–0.67139=−0.24245)	=	−34.3 thousand
Total change (sum of Cols. D, E and F) (table 1, Col. G)	=	60.7 thousand
Net relative change 1940–50 (sum of Cols. E and F, not shown in table 1)	=	23.0 thousand

Thus, the change in New England's contract construction employment was 23.0 thousand in excess of what would have occurred at the overall national rate for all industries combined.

The results for New England's overall employment growth from 1940 to 1950 are presented in the "Total" line at the bottom of the table. In this line, the entries are the simple algebraic sums of the corresponding entries for the separate industries. In rounded form they are:

Column D, change related to national growth	816.0 thousand
Column E, change related to industrial mix	225.2 thousand
Column F, change related to regional share	−440.1 thousand
Column G, total change (sum of D, E and F)	601.0 thousand
Total net relative change (H) (sum of E and F)	−214.9 thousand

It is apparent that in April of 1950 New England would have needed an extra 214.9 thousand employees to account for the same percent of the Nation's total that it represented in April of 1940.

The change components identified under industrial mix and regional share will depend in part upon the level of industrial detail (within a given total) under analysis. However, changes in these two components, induced by changes in the degree of industrial detail, are equal in absolute value and of opposite sign for every area under analysis. It follows that their sum, the total net relative change, is unaffected by any such changes for any given area. A downward sloping dotted line in the lower (1950–60) panel of chart 8 (parallel to the line D–I–H) shows the path along which the point for a particular region (the Far West) would move in response to such changes.

The Business Situation

(*Continued from page 3*)

stocks of steel from the high levels that prevailed while the labor negotiations were in progress last year. With consumption rising from the usual summer lull and receipts of steel running below the rate of consumption, stocks began to fall last September, and the decline accelerated in the closing months of 1965. The 4-million-ton reduction in steel stocks in the October-December period—the largest for any quarter since the Census Bureau started to collect these figures more than 4 years ago—brought yearend inventories to 13.1 million tons, the lowest level since February 1965. At the end of 1965, stocks of manufacturing consumers represented 51 days of supply at the December rate of consumption. Last August, at the peak of the inventory buildup, the corresponding figure was 74 days. None of the above data have been adjusted for seasonal influences.

How much more consumers will reduce their current steel inventories is by no means clear at the present time. In the first three quarters of 1964, prior to the stockpiling in anticipation of a possible strike in the spring of 1965, manufacturing consumers maintained a 40-day supply. It is not certain, however, that in the current setting steel consumers will cut back quite so far. With demand strong and production delays more frequent, they may well settle on somewhat larger inventories than they considered "normal" in recent years.

Steel imports at new high

Because of the unusually strong domestic demand for steel last year, imports rose considerably while exports declined. In this respect, last year's experience was a repetition of 1962 and 1963, when hedge buying against the possibility of a strike was a dominant feature in steel markets.

In 1965, imports of steel increased to 10.4 million tons—the highest on record—from 6.4 million in 1964, while exports declined to 2.5 million from the 3.4 million total of 1964 (chart 3). The inflow of steel was exceptionally large during most of 1965, reaching more than 12 million tons at an annual rate in the second quarter before falling gradually to 10 million tons in the October–December period. In contrast, exports remained relatively low, though some pickup occurred in the final quarter of the year.

Last year was the seventh consecutive year in which the United States was a net purchaser of steel. The 1965 import balance of 7.9 million tons was by far the largest ever reported, more than 2½ times net imports in 1964. In the second quarter of 1965, the excess of imports over exports amounted to 10 million tons at an annual rate; the gap, however, narrowed considerably thereafter.

Imports of all of the principal steel product groups increased in 1965. The largest gains were in sheet and strip, which nearly tripled, and in structural shapes and plates, which scored a 60 percent gain. Imports of sheet and strip have shown a strong uptrend in recent years, from less than 200,000 tons in 1961 to well over 3.5 million in 1965; their share of total steel imports over this period rose from 5 percent to approximately one-third. This increased domestic use of imported sheet and strip reflects in part rising demand from the motor vehicle industry. It also reflects the growing capacity of foreign countries to produce a wide range of steel products and the ability of steel producers abroad to compete in the U.S. market.