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## CHAPTER III

### CONSTRUCTION

The Occupation Statistics of the 1920 Census of Population indicate that there were about 21,300,000 male employees in the Continental United States in 1920. Of these, approximately 2,500,000, or more than 11 per cent, are listed under occupations usually associated with the construction industry. The number actually attached to this industry is, of course, much smaller.<sup>1</sup> It is also understood that many of those nominally attached to construction do not draw their income wholly from this industry. The seasonal nature of the industry makes it necessary for some to seek employment at other occupations for a considerable part of the year. However, it is apparent that the wages and salaries in construction play an important rôle in the income of the American people. Unfortunately, there are no reliable statistics to enable us to measure accurately the amount of wages and salaries paid out annually in this industry, and to determine the share of the total received by employees in each State is even more difficult.

Construction is subject to fluctuations to a greater extent than any other industry, and it is probably foremost in the amount of unemployment among its workers. The earnings of employees in building construction vary greatly from time to time, and from place to place. Union scales of wages, which may be obtained for the building trades in the principal cities,<sup>2</sup> fail to indicate average yearly earnings, and apparently should be used with great caution in making estimates. It is known to be a fact that in times of depression union men manage to work for less than the regular scales, and, during periods of high building activity, the quoted scales exist only on paper.

Local conditions have a very great influence on the volume of construction and thereby affect the total earnings of those engaged

<sup>1</sup> See p. 23.

<sup>2</sup> Made available by the U. S. Bureau of Labor Statistics in its Bulletins *Union Scales of Wages and Hours of Labor* published annually, within recent years, as of May 15.

in the industry within a given area. Thus, increased building activity may start in one section of the country and not reach other localities until a year or so later. For example, according to figures published by the F. W. Dodge Corporation, the combined value of construction, in millions of dollars, in Ohio, Illinois, and Wisconsin was 696 in 1919, 598 in 1920, and 512 in 1921,<sup>1</sup> showing 1919 to be the highest year in building activity. During the same period, New York and New Jersey had a combined value of construction, in millions of dollars, of 577 in 1919, 639 in 1920, and 674 in 1921, which puts 1919 at the bottom. Similar differences are found in other sections of the country; hence, even if it were possible to obtain accurate rates of pay and accurate figures as to the number of persons attached to the construction industry in each State, the index constructed from these two factors would in itself be of doubtful value. Such an index would be only representative of normal full-time earnings which, in the construction industry, are only imaginary quantities. How, then, can we apportion the total wage and salary bill of the construction industry among the several States? It would appear that the volume of construction, if satisfactory figures can be obtained for each State, should afford an index which would be very helpful in estimating the actual amounts paid out in wages and salaries in this industry, especially if used in conjunction with an index based upon the total number of employees attached to the industry.

#### **Index of the Volume of Construction by States.**

There are two main sources for data pertaining to the volume of construction in the United States — first, the value of building permits, which may be obtained for over one hundred representative cities; second, the figures on construction contracts awarded, published by the F. W. Dodge Corporation.

Neither of these two sets of data is complete in itself. The former takes in all the building construction within certain cities, and takes no cognizance of other types of construction or buildings outside of city jurisdiction. Thus, industrial buildings located outside of city limits, which in some sections of the country are very important, are not reported under permit statistics. On the

<sup>1</sup> Adjusted to a 1913 basis, these figures, in millions of dollars, were 355, 238, and 283, respectively.

other hand, the F. W. Dodge Corporation figures, though representing the bulk of construction in the territory of that organization, cover, for the period under consideration, only about twenty-seven States in the East and Middle West.

An attempt has therefore been made to combine the data from the two sources in order to build up a percentage index of the volume<sup>1</sup> of construction to include all the States in the Union. In computing this index, it has been assumed that the F. W. Dodge figures are, if not complete, at least proportionately representative for all States reported, i.e., that the per cent of under-reporting, if such existed, was the same for all States under consideration. The States for which the F. W. Dodge reports are admittedly incomplete have been eliminated, so that approximations may be built up for them on the same basis as for States outside of the Dodge Corporation territory.

To facilitate discussion, we shall designate the two groups of data A and B, as follows:

- A. Estimates based chiefly on building permits.
- B. Figures reported by the F. W. Dodge Corporation.

The volume of construction in the States falling in group A has been estimated for 1920 according to the empirical formula given below, in which

V is the volume of construction in the State (comparable with the Dodge figures).

P is the amount of permits in specified cities.

C is the 1920 population in these cities.

S is the adjusted population for the State.

q is the correction added for industrial buildings, etc., for which permits are ordinarily not required.

$$\text{Formula: } V = \frac{P}{C} S + q.$$

It has been assumed that per capita building is considerably lower in rural than in urban communities, and in computing "S"

<sup>1</sup> Since this index refers to the proportion of the total construction of the country credited to each State each year, it may be taken to represent either *volume* or *value* of construction, i.e., in this case, the two are practically identical. We are here dealing with each year separately, and we are consequently not concerned about changes in the cost of construction from year to year, which generally differentiate indices of *physical volume* from those of *value*.

in the foregoing formula, rural population is given a weight of 1, as compared with 4 for urban population. In order to allow for such construction as is not included in building permits, the correcting factor "q" has been introduced, "q" being an estimate of the value of industrial building based on the amount of such building taking place in the territory covered by the F. W. Dodge Corporation, and apportioned to each State in accordance with the capital invested in manufacturing, as reported by the 1914 Census.

The estimates for the States in the South and West (group A), have been combined with the figures for the twenty-seven States covered by the Dodge Corporation (group B). The combined total then served as a basis for calculating percentage indices of the volume of construction in each State.

As can be seen, the estimates of the relative volumes of construction thus computed, are, at best, only rough approximations, and, in the aggregate, may carry a considerable error. However, for the purpose at hand we are not interested in aggregates. What we want is the fraction or percentage of the total volume of construction which may be ascribed to each State, and it is believed that the values calculated for States in group A are fairly representative of the *relative* volumes of construction in these States, and are sufficiently comparable with figures recorded by the F. W. Dodge Corporation to warrant the use of the two sets of data in the computation of a percentage index of construction by States.

A rough check as to the accuracy of the estimated indices of the volume of construction by States is presented in the last three columns of Table VI. It is obvious that all communities with a stationary population require comparatively little new construction, their needs being confined chiefly to replacements of existing buildings. Hence, one would expect the volume of construction to be affected principally by the rate of increase in population. In this connection, it should also be observed that, in most of the States of the Union, the growth in rural population in recent years has been negligible, and, consequently, urban population would be virtually the determining factor in the volume of construction required in each State. In Column D of the table, we have averages of the 1919, 1920, and 1921 percentages of the total estimated volume of construction in each State. Column E gives the per-

TABLE VI. — PER CENT IN EACH STATE OF THE TOTAL VOLUME OF CONSTRUCTION, THE TOTAL URBAN POPULATION, AND THE GROWTH IN URBAN POPULATION

STATE AND GEOGRAPHIC DIVISION	A	B	C	D	E	F
	PER CENT OF TOTAL					
	Volume of Construction				Urban Population 1920	Growth in Urban Population 1910-1920
1919	1920	1921	Average for 3 yrs.			
<b>Continental United States</b> .....	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>
<b>New England</b> .....	<b>7.032</b>	<b>8.638</b>	<b>6.380</b>	<b>7.350</b>	<b>10.800</b>	<b>7.137</b>
Maine.....	.336	.447	.283	.355	.552	.313
New Hampshire.....	.215	.411	.221	.282	.515	.206
Vermont.....	.188	.214	.174	.192	.203	.090
Massachusetts.....	3.646	4.498	3.666	3.937	6.721	4.322
Rhode Island.....	.556	.532	.513	.534	1.085	.527
Connecticut.....	2.091	2.536	1.523	2.050	1.724	1.679
<b>Middle Atlantic</b> .....	<b>25.367</b>	<b>24.717</b>	<b>28.049</b>	<b>26.045</b>	<b>30.702</b>	<b>24.333</b>
New York.....	12.807	13.752	16.311	14.290	15.818	11.557
New Jersey.....	4.202	4.247	4.633	4.361	4.558	4.733
Pennsylvania.....	8.358	6.718	7.105	7.394	10.326	8.043
<b>East North Central</b> .....	<b>28.936</b>	<b>24.709</b>	<b>22.856</b>	<b>25.500</b>	<b>24.030</b>	<b>28.284</b>
Ohio.....	9.266	7.954	7.674	8.298	6.772	8.331
Indiana.....	2.619	2.997	2.624	2.747	2.730	2.790
Illinois.....	8.764	6.257	6.181	7.067	8.108	7.647
Michigan.....	5.831	4.886	4.316	5.011	4.128	7.532
Wisconsin.....	2.456	2.615	2.061	2.377	2.292	1.984
<b>West North Central</b> .....	<b>8.865</b>	<b>9.057</b>	<b>8.146</b>	<b>8.689</b>	<b>8.705</b>	<b>7.022</b>
Minnesota.....	1.920	2.122	2.220	2.087	1.937	1.663
Iowa.....	2.200	2.108	1.489	1.932	1.612	1.605
Missouri.....	2.501	2.238	1.751	2.163	2.922	1.547
North Dakota.....	.121	.208	.034	.121	.162	.206
South Dakota.....	.177	.273	.280	.244	.188	.206
Nebraska.....	.927	1.224	1.057	1.089	.746	.774
Kansas.....	1.019	.884	1.315	1.073	1.138	1.021
<b>South Atlantic</b> .....	<b>10.130</b>	<b>10.124</b>	<b>9.860</b>	<b>10.038</b>	<b>7.990</b>	<b>10.265</b>
Delaware.....	.286	.163	.280	.243	.222	.197
Maryland.....	1.317	1.697	1.396	1.470	1.601	1.737
District of Columbia.....	1.190	.763	1.163	1.039	.806	.881
Virginia.....	2.111	1.025	1.402	1.513	1.241	1.622
West Virginia.....	1.054	.999	1.079	1.044	.680	1.160
North Carolina.....	1.045	1.393	1.083	1.174	.903	1.416
South Carolina.....	.680	1.188	.833	.900	.541	.568
Georgia.....	1.708	2.032	1.620	1.786	1.341	1.556
Florida.....	.739	.864	1.004	.869	.655	1.128
<b>East South Central</b> .....	<b>3.258</b>	<b>3.555</b>	<b>4.166</b>	<b>3.660</b>	<b>3.672</b>	<b>3.466</b>
Kentucky.....	.622	.839	.805	.755	1.166	.650
Tennessee.....	1.355	1.334	1.583	1.424	1.126	1.400
Alabama.....	.807	.870	1.172	.950	.938	1.144
Mississippi.....	.474	.512	.606	.531	.442	.272
<b>West South Central</b> .....	<b>8.194</b>	<b>8.128</b>	<b>8.261</b>	<b>8.194</b>	<b>5.471</b>	<b>8.331</b>
Arkansas.....	.842	1.114	1.216	1.057	.535	.716
Louisiana.....	.760	1.337	.852	.983	1.157	1.079
Oklahoma.....	1.808	1.542	1.567	1.639	.993	1.803
Texas.....	4.784	4.135	4.626	4.515	2.786	4.733
<b>Mountain</b> .....	<b>2.533</b>	<b>2.924</b>	<b>2.279</b>	<b>2.579</b>	<b>2.237</b>	<b>2.198</b>
Montana.....	.639	.436	.224	.433	.317	.321
Idaho.....	.439	.338	.323	.367	.219	.403
Wyoming.....	.109	.250	.140	.166	.105	.115
Colorado.....	.542	.963	.696	.734	.835	.395
New Mexico.....	.121	.177	.258	.185	.120	.148
Arizona.....	.292	.484	.326	.367	.216	.445
Utah.....	.356	.236	.274	.289	.397	.354
Nevada.....	.035	.040	.038	.038	.028	.017
<b>Pacific</b> .....	<b>5.685</b>	<b>8.148</b>	<b>10.003</b>	<b>7.945</b>	<b>6.393</b>	<b>8.964</b>
Washington.....	1.232	1.095	1.066	1.131	1.379	1.177
Oregon.....	.636	.735	1.052	.808	.720	.691
California.....	3.817	6.318	7.885	6.006	4.294	7.096

centages of the total urban population in each State as recorded in the Census of 1920. Column F shows the percentage of the total increase in urban population in each State during the decade 1910 to 1920. Evidently, the requirements for building construction should lie somewhere between the figures recorded in Column E and Column F.

Considering the fact that the population figures in our table represent a period of ten years and that construction figures cover a period of only three years, the correlation between the columns showing volume of construction and the columns representing urban population and growth in urban population should be considered as very good. Taking the figures by geographic division, we find that during the three-year period, 1919 to 1921, the New England States had 7.3 per cent of the total volume of construction of the country. The growth in urban population in these States during the decade 1910 to 1920 was 7.1 per cent of the national total. In the Middle Atlantic States we have a percentage of total construction of 26, as compared with a percentage of total growth in urban population of over 24. In the East North Central States, the total construction and the total urban population seem to be closer together than the total construction and the growth in urban population. However, an average of the percentages representing urban population and the growth of urban population gives a little over 26, comparing favorably with the percentage of total construction, which is 25.5. In other sections of the country the percentages of the total construction seem to run close to those representing respectively the total urban population in 1920 and the total growth in population during the decade.

The first three columns of Table VI, giving the percentages of the total volume of construction by States in each of the three years, also contain features that may prove of interest. It will be seen from these figures that, as previously observed, construction activities do not fluctuate uniformly throughout the country. Depressions and revivals do not seem to visit all sections of the country at the same time — so that while one State may be at the bottom of the "building cycle," another may have already reached the crest of the wave. In 1919 the Middle Atlantic States accounted for about  $25\frac{1}{2}$  per cent of the total volume of building in

the country. In 1921 this section had to its credit 28 per cent of the total volume. In the same years, the East North Central States dropped from nearly 29 per cent of the total to less than 23 per cent. In these two groups, the greatest rise took place in New York — from 12.8 per cent to 16.3 per cent — and the greatest drop in Illinois and Ohio. Considering the country as a whole, California shows the greatest change in its share of the total volume of construction between 1919 and 1921. In 1919 California's share was only 3.8 per cent, while in 1921 it rose to 7.9 per cent.

The changes in the volume of construction from year to year are, of course, not entirely due to actual gains or losses in any given States. The changes are more or less relative, depending in a large measure upon the changes in the volume of construction in the entire country. Thus, the increase in California from 3.8 per cent to 7.9 per cent was due in part to the actual increase in volume, and in part to the fact that in 1921 the total amount of construction in the entire country was lower than in 1919.

#### **Index for the Apportionment of Wages and Salaries by States in the Construction Industry.**

If it were true that labor receives relatively the same portion of the total value of construction in each section of the country, the index of the volume of construction would in itself serve as an index of the amount of wages and salaries paid out in the building industry in each State. However, this can hardly be the case. It is only reasonable to believe that the differences in the level of wages would influence the proportion of the total value of construction being disbursed in the form of wages and salaries. It is, therefore, necessary to give some weight in our index to differences in the wage level in the various States. To accomplish this, hypothetical totals of wages and salaries in the construction industry in each State have been computed on the basis of union scales of wages in the building trades and the estimated total number of workers attached to the industry in each State. Percentages of the total wages and salaries for each State estimated in this manner were then combined with the percentages of the total volume of construction (Table VI) in the ratio of 1 to 4, and the results were

used as the corrected percentage indices by States of wages and salaries in construction. (See Table VII.)

The union scales of wages used in computing the hypothetical amounts of wages in building trades are based on figures furnished by the United States Bureau of Labor Statistics. These wage indicators were computed from the union scales of the following thirteen building trades: Bricklayers, Carpenters, Steam Fitters, Hod-carriers, Inside Wiremen, Painters, Plasterers, Plumbers and Gas Fitters, Sheet Metal Workers, Cement Finishers, Stone Masons, Structural Iron Workers, and Tile Layers. No attempt has been made to weight these wage scales, the indicators for each State being the sums of the weekly rates of pay of the thirteen trades. Though these indicators cannot be recommended as being exact, they would seem to be accurate enough for our purposes. The validity of these indicators is somewhat substantiated by the comparison of these rates of pay with annual earnings of male wage earners in manufacturing in 1919, which is discussed in Chapter IV, page 78. The Union Scales of Wages in the thirteen building trades listed above are given on an annual basis in Table VIII (Column F), pages 100, 102.

#### **Estimated Income from Wages and Salaries in the Construction Industry.**

Table VII summarizes for the three years the estimated income from wages and salaries in construction received by employees in each State. It will be seen that, on the whole, the construction industry followed the general business and industrial conditions of the country, showing the results of a distinct depression in 1921. In this year, the wage bill for the entire country dropped more than 20 per cent below the 1919 or 1920 totals. However, not all sections of the country seem to have been affected to the same extent. Some show distinct improvements in 1921 over either 1919 or 1920, and it would seem that in some States 1921 was actually the highest of the three years, particularly if we take into consideration the fact that the cost of living in 1921 was considerably lower than in either of the two other years. The geographic redistribution of the national total in the three years, as indicated by the last three columns of Table VII, is also worthy of note. Some sections of the

TABLE VII.—TOTAL WAGES AND SALARIES PAID OUT IN THE CONSTRUCTION INDUSTRY IN EACH STATE

1919—1920—1921

STATE AND GEOGRAPHIC DIVISION	DOLLARS (000's Omitted)			PER CENT OF TOTAL		
	1919	1920	1921	1919	1920	1921
<b>Continental United States...</b>	<b>1,349,580</b>	<b>1,326,102</b>	<b>1,054,848</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>
<b>New England.....</b>	<b>96,522</b>	<b>111,684</b>	<b>69,820</b>	<b>7.152</b>	<b>8.422</b>	<b>6.619</b>
Maine.....	6,046	6,790	4,188	.448	.512	.397
New Hampshire.....	3,549	5,583	2,785	.263	.421	.264
Vermont.....	2,767	2,997	2,046	.205	.226	.194
Massachusetts.....	49,988	58,269	39,293	3.704	4.394	3.725
Rhode Island.....	7,626	7,267	5,622	.565	.548	.533
Connecticut.....	26,546	30,778	15,886	1.967	2.321	1.506
<b>Middle Atlantic.....</b>	<b>339,379</b>	<b>329,404</b>	<b>290,231</b>	<b>25.147</b>	<b>24.840</b>	<b>27.514</b>
New York.....	169,022	178,427	162,921	12.524	13.455	15.445
New Jersey.....	56,817	57,102	48,734	4.210	4.306	4.620
Pennsylvania.....	113,540	93,875	78,576	8.413	7.079	7.449
<b>East North Central.....</b>	<b>372,875</b>	<b>324,789</b>	<b>241,306</b>	<b>27.629</b>	<b>24.492</b>	<b>22.876</b>
Ohio.....	117,521	102,189	78,755	8.708	7.706	7.466
Indiana.....	35,521	39,584	28,164	2.632	2.985	2.670
Illinois.....	113,108	86,423	67,668	8.381	6.517	6.415
Michigan.....	74,267	63,109	44,683	5.503	4.759	4.236
Wisconsin.....	32,468	33,484	22,036	2.405	2.525	2.089
<b>West North Central.....</b>	<b>126,753</b>	<b>126,457</b>	<b>92,964</b>	<b>9.392</b>	<b>9.536</b>	<b>8.813</b>
Minnesota.....	27,005	28,869	23,734	2.001	2.177	2.250
Iowa.....	29,988	28,445	17,447	2.222	2.145	1.654
Missouri.....	35,548	31,853	21,318	2.634	2.402	2.021
North Dakota.....	2,254	3,024	1,044	.167	.228	.099
South Dakota.....	3,199	3,991	3,376	.237	.301	.320
Nebraska.....	13,266	16,430	11,551	.983	1.239	1.095
Kansas.....	15,493	13,845	14,494	1.148	1.044	1.374
<b>South Atlantic.....</b>	<b>135,889</b>	<b>131,960</b>	<b>102,584</b>	<b>10.069</b>	<b>9.951</b>	<b>9.725</b>
Delaware.....	3,873	2,520	2,996	.287	.190	.284
Maryland.....	19,110	22,703	15,601	1.416	1.712	1.479
District of Columbia.....	14,212	9,269	10,844	1.053	.699	1.028
Virginia.....	27,828	15,621	15,327	2.062	1.178	1.453
West Virginia.....	14,360	13,420	11,224	1.064	1.012	1.064
North Carolina.....	14,494	17,597	11,392	1.074	1.327	1.080
South Carolina.....	9,393	14,415	8,470	.696	1.087	.803
Georgia.....	21,809	24,745	16,234	1.616	1.866	1.539
Florida.....	10,810	11,670	10,496	.801	.880	.995
<b>East South Central.....</b>	<b>46,102</b>	<b>48,045</b>	<b>43,597</b>	<b>3.416</b>	<b>3.623</b>	<b>4.133</b>
Kentucky.....	9,852	11,842	9,399	.730	.893	.891
Tennessee.....	17,976	17,425	15,865	1.332	1.314	1.504
Alabama.....	11,512	11,869	12,036	.853	.895	1.141
Mississippi.....	6,762	6,909	6,297	.501	.521	.597
<b>West South Central.....</b>	<b>108,911</b>	<b>105,001</b>	<b>85,856</b>	<b>8.070</b>	<b>7.918</b>	<b>8.139</b>
Arkansas.....	11,282	13,831	11,825	.836	1.043	1.121
Louisiana.....	11,498	17,333	9,821	.852	1.307	.931
Oklahoma.....	24,131	20,448	16,783	1.788	1.542	1.591
Texas.....	62,000	53,389	47,427	4.594	4.026	4.496
<b>Mountain.....</b>	<b>37,046</b>	<b>39,690</b>	<b>25,991</b>	<b>2.745</b>	<b>2.993</b>	<b>2.464</b>
Montana.....	8,637	6,180	3,070	.640	.466	.291
Idaho.....	5,938	4,641	3,555	.440	.350	.337
Wyoming.....	1,930	3,302	1,698	.143	.249	.161
Colorado.....	8,368	12,585	7,753	.620	.949	.754
New Mexico.....	2,024	2,492	2,670	.150	.188	.254
Arizona.....	4,251	6,087	3,523	.315	.459	.334
Utah.....	5,210	3,713	3,186	.386	.280	.302
Nevada.....	688	690	527	.051	.052	.050
<b>Pacific.....</b>	<b>86,103</b>	<b>109,072</b>	<b>102,499</b>	<b>6.380</b>	<b>8.225</b>	<b>9.717</b>
Washington.....	19,272	17,014	13,122	1.428	1.283	1.244
Oregon.....	10,041	10,635	11,023	.744	.802	1.045
California.....	56,790	81,423	78,354	4.208	6.140	7.428

country, including the New England States, have undoubtedly "lost out" in 1921, both in actual amounts, and in the relative share of the total to which they would seem to be entitled under more favorable conditions. The Middle Atlantic States, on the other hand, especially New York and New Jersey, show a decided gain in 1921 in the relative share their employees received of the total wage bill from construction. However, the greatest relative gain in construction payrolls appears to have taken place in the Pacific States, where California alone jumped from 4.2 per cent of the total in 1919 to 7.4 per cent of the total in 1921. In absolute figures, the payrolls in the construction industry in California increased from about 57 millions in 1919 to about 78 millions in 1921, a rise of about 38 per cent. Oregon also shows a slight increase in 1921 over the 1919 payrolls.