

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Non-Farm Residential Construction, 1920-1936

Volume Author/Editor: Wickens, David L. and Ray R. Foster

Volume Publisher: UMI

Volume URL: <http://www.nber.org/books/wick37-1>

Publication Date: 1937

Chapter Title: Non-Farm Residential Construction, 1920-1936

Chapter Author: David L. Wickens, Ray R. Foster

Chapter URL: <http://www.nber.org/chapters/c4269>

Chapter pages in book: (p. 1 - 20)

# National Bureau of Economic Research

BULLETIN 65

SEPTEMBER 15, 1937

1819 BROADWAY, NEW YORK

A NON-PROFIT MEMBERSHIP CORPORATION FOR IMPARTIAL STUDIES IN ECONOMIC AND SOCIAL SCIENCE

## Non-Farm Residential Construction, 1920-1936

Copyright 1937, National Bureau of Economic Research, Inc.

DAVID L. WICKENS and RAY R. FOSTER

RESIDENTIAL construction has at last started to revive in the United States after a decade of decline. For several years, particularly from 1932 through 1934, the depression was so severe that practically no new construction was undertaken. Not until 1936 did residential building reach significant proportions. General economic recovery has now advanced sufficiently to lead many families to consider investing in houses.

During the period of active construction in the 1920's, current statistical measures of building then available, not only were restricted primarily to indicating the areas in which activity was especially marked, but also showed conflicting trends. There was no accurate yardstick by which to gauge the relative total importance of the construction industry in the national economy, and measures of its wide ramifications, from the manufacture of building materials to real estate finance and investment, in various parts of the country, were even less adequate. The severe depression following 1929 provided evidence of the basic importance of construction to the economic well-being of the nation as a whole. It also emphasized the peculiar character of construction among American industries, as an aggregate of many local industries, whose prosperity is dependent in considerable part upon local conditions.

Notwithstanding the unfortunate results of being uninformed in the crucial years of the latest period of marked activity in construction, we have continued to suffer from the absence of comprehensive data on residential building and the lack of adequate regional analyses. In view of the renewed activity in building now evident in many American communities, it is important that reliable statistical measures be widely available. Without them it will be difficult to gauge the significance of building booms, and any efforts to control wide variations in activity in the construction industry will continue to be handicapped by lack of information. In an effort to meet the need for such data and

as a part of a broad project for the study of real estate financing and economic stability being conducted by the National Bureau of Economic Research, new estimates of the volume and value of non-farm residential construction in the United States from 1920 through 1936 are presented in this *Bulletin*. These estimates are based upon building permits<sup>1</sup> rather than building contracts. Instead of following the method most widely used heretofore of raising the amount of contracts reported for a group of states by an arbitrary percentage to account for states not reported, the present estimates make use of ratios of the number of dwelling units built to the increase in number of families in representative cities, which ratios were applied (with appropriate adjustments) to the increase in number of families in areas not covered by data on building permits, to obtain the total number of dwelling units built. Separate estimates of the volume of building were made for large metropolitan centers, for their suburbs, for smaller urban centers, and for villages and unincorporated areas, within each geographic region. The aggregate value of the dwellings built was obtained by multiplying the estimated number of dwelling units by the corresponding average costs per unit in each class of city.

The methods used in making these estimates, described in greater detail in Section II, were, of necessity adapted to the data available. Accordingly, they are presented as approximations, subject to the limitations imposed by the deficiencies of the data themselves.

### I

New housing accommodations supplied for the United States during the decade of the 1920's totaled approximately

<sup>1</sup>Special acknowledgment is due the United States Bureau of Labor Statistics for the use of its building permit data, and particularly to Herman Byer, Chief, Division of Construction and Public Employment, for making available numerous special tabulations.

TABLE 1  
NEW RESIDENTIAL BUILDING IN THE UNITED STATES OTHER THAN ON  
FARMS, ESTIMATED VOLUME, 1920-1936

YEAR	NUMBER OF NEW DWELLING UNITS CONSTRUCTED (thousands)	VALUE OF ALL RESIDENTIAL CONSTRUCTION <sup>1</sup> (millions of dollars)
1920	247	1,122
1921	449	1,841
1922	716	3,115
1923	871	3,980
1924	893	4,244
1925	937	4,754
1926	849	4,314
1927	810	4,064
1928	753	3,813
1929	509	2,623
1930	286	1,456
1931	212	1,005
1932	74	282
1933	54	204
1934	55	214
1935	144	585
1936	282	1,202

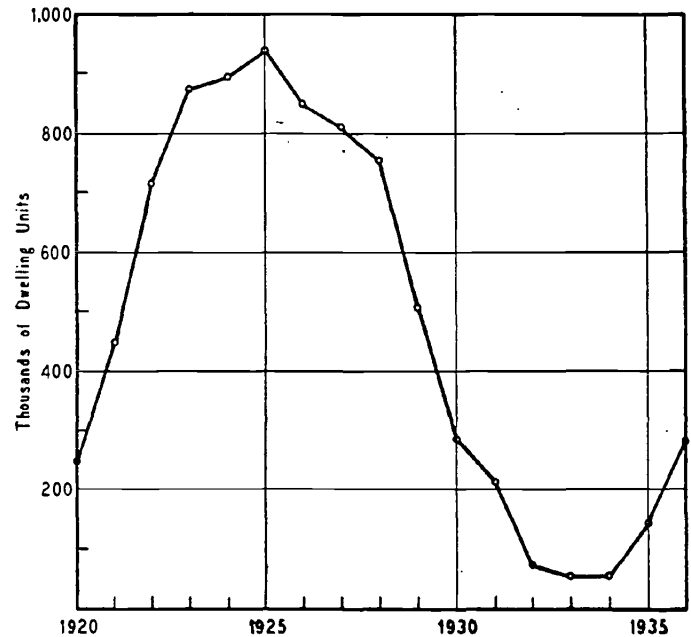
<sup>1</sup>Including non-housekeeping dwellings (hotels, clubs and lodging houses).

7,000,000 dwelling units<sup>2</sup> in houses, apartments, house-keeping units, and flats. This means that on the average about 700,000 families were provided for each year. At the crest of this wave of building in 1925, over 900,000 units were constructed. At the trough, in 1933 and 1934, about 54,000 dwelling units were built. For 1936, estimates indicate that over 280,000 units were constructed, more than five times as many as in 1933, but only 40 per cent of the average of the 1920's (Chart 1 and Table 1). If the ten-year average of 700,000 units built from 1920 to 1929 is used as a base from which to measure, the extremes of the fluctuations are marked by a growth from 35 per cent of the average in 1920 to 133 per cent in 1925, a fall to 8 per cent in 1933, and a renewed rise to 40 per cent in 1936.

The nation's annual expenditures for its new residential structures fluctuate in general with the number built. However, over a period of years, the sum expended per unit varies with changes in prices of materials and wage rates, as well as with changes in contractors' margins, and financing costs. New styles in housing, which have popularized more elaborate fixtures and equipment of all kinds, have tended to make building more expensive, although this is partly offset by a gradual reduction in the average size of new dwelling units. More general provision for plumbing, heating, lighting, and especially for better cooling and refrigeration, has raised the cost of all housing.

<sup>2</sup>In these estimates, a dwelling unit is that part of a structure originally intended for the occupancy of a single family as living quarters. All data in this *Bulletin* refer to non-farm residential buildings.

Chart 1  
NUMBER OF NEW DWELLING UNITS BUILT  
1920-1936



For apartments, services and facilities have become more elaborate. Changes in average cost per dwelling unit are discussed further below.

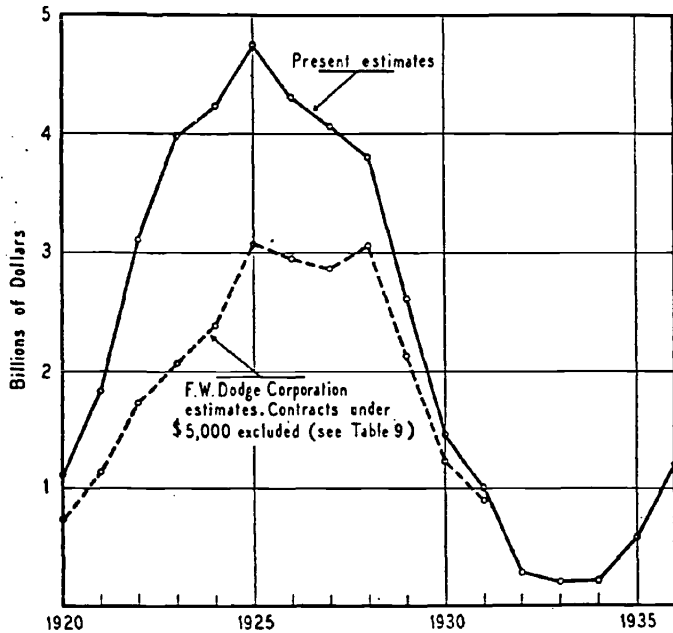
For the decade of the 1920's aggregate expenditures for the construction of residences totaled 34 billion dollars, or an annual average of 3.4 billion dollars. Annual totals range from one billion in 1920 to nearly 5 billion in 1925, and only one-quarter billion in 1933 and 1934. These figures do not include the value of the land. Based upon the average for the decade of the 1920's as 100, the value of new building in 1920 was 33 per cent, in 1925, 141 per cent, in 1933, 6 per cent, and in 1936, 35 per cent or about the 1920 level (Table 1 and Chart 2, Curve A). Fluctuations as great as these in the largest branch of the construction industry have serious repercussions on production and employment in many related industries, as well as on financial institutions and on the general prosperity of the country.

#### COMPARISON WITH OTHER ESTIMATES: VALUE

The present estimates of the value of new residential construction are substantially higher than those previously available, especially for years prior to 1928. For 1922-26, as shown by Curve A, Chart 2, they are from 50 to 100 per cent higher than estimates of the F. W. Dodge Corporation (Curve B). However, the latter covered only contracts over \$5,000.<sup>3</sup> Thus, the difference between Curves

<sup>3</sup>The value of all contracts for new buildings under \$5,000 was estimated by the F. W. Dodge Corporation to be \$871,000,000 in 1928 and \$740,000,000 in 1929. Many of these projects under \$5,000 were residential buildings.

Chart 2  
**VALUE OF NEW RESIDENTIAL CONSTRUCTION,  
 1920-1936, COMPARED WITH PREVIOUS  
 ESTIMATES**



A and B is, to a considerable extent, an indicator of the volume of new dwellings costing less than \$5,000 each, although part of the difference may be due to changes in coverage of the contracts data in earlier years. These points are discussed further in the Appendix. Estimates of the Federal Employment Stabilization Board for 1925-32, based on F. W. Dodge contracts data for 37 states, are practically the same as the F. W. Dodge estimates for 48 states (see Table 9).

**COMPARISON WITH OTHER ESTIMATES: NUMBER OF DWELLING UNITS**

Although estimates of the aggregate value of residential construction annually over a period of years have been available for some time, similar estimates of the total number of dwelling units built have been published only recently. In addition to the estimates in this *Bulletin*, which were presented in preliminary form at the December 28, 1936 meeting of the American Statistical Association,<sup>4</sup> estimates of the number of dwelling units built annually since 1920 have been published by the Brookings Institution,<sup>5</sup> and for 1915-36 by Lowell J. Chawner of the United States Bureau of Foreign and Domestic Commerce.<sup>6</sup> The Brookings and Chawner series are based largely on building permit data, and the totals for the country as a whole have the same general year-to-year trend as the estimates in this *Bulletin*, though differing in method of derivation.

<sup>4</sup>*Journal of the American Statistical Association*, March 1937, p. 97.

<sup>5</sup>*The Recovery Problem in the United States* (1937), pp. 183-8.

<sup>6</sup>*The Annals* (American Academy of Political and Social Science), March 1937, Vol. 190, p. 25.

Notice of completion of a report "... embodying a series of estimates on housing construction during the years 1920-36 ..." by the Federal Housing Administration was made in the *Journal of the American Statistical Association*, March 1937, p. 150. This series also was based on building permits. The data for the several years cited are in general agreement with those of the other estimates discussed above.

**TURNING POINT IN RESIDENTIAL CONSTRUCTION IN 1925**

The present estimates indicate that residential construction was at its peak in 1925. This is a departure from the view widely held heretofore. Both building permits and contracts awarded—the data on residential building currently available in the 1920's—indicated a decline in residential building in 1926 and 1927. In 1928 building permits declined further, while contracts were reported as increasing to a level slightly higher than the 1925 peak. Largely on the basis of the trend of these reported contracts, 1928 has heretofore been generally accepted as the last high point in residential construction, and it has been a general impression that the decline in this industry preceded by only a short period the decline in general business activity.<sup>7</sup> From the present estimates it appears that resi-

<sup>7</sup>That the turning point occurred in 1925 rather than in 1928 is confirmed by data on shipments of materials used in residential building such as bathtubs, lavatories and kitchen sinks (see Chart 11 and discussion in Section II).

Chart 3  
**NUMBER OF NEW DWELLING UNITS BUILT,  
 BY TYPE OF DWELLING  
 1920-1936**

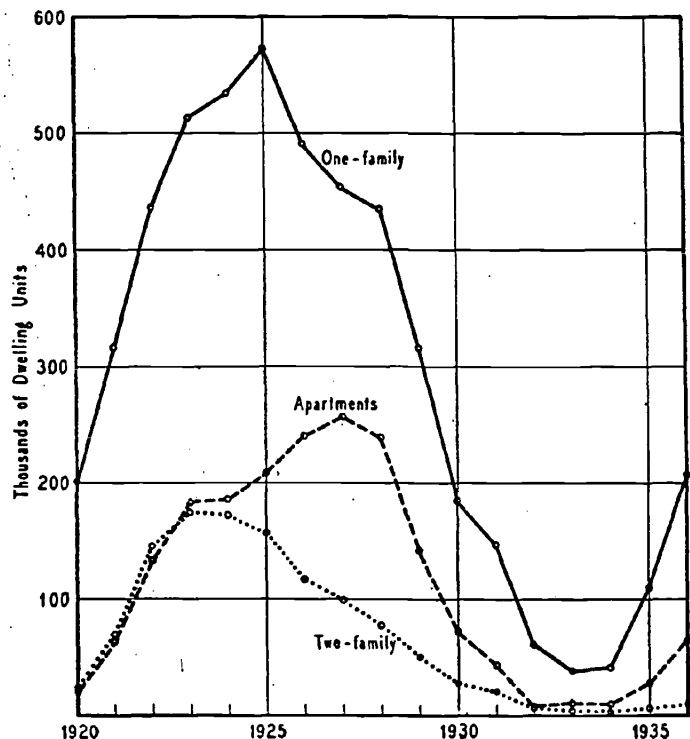


TABLE 2

NUMBER AND DISTRIBUTION OF NEW NON-FARM DWELLING UNITS BUILT, BY TYPE OF DWELLING AND BY PERIOD, 1920-1936  
(absolute numbers in thousands of dwelling units)

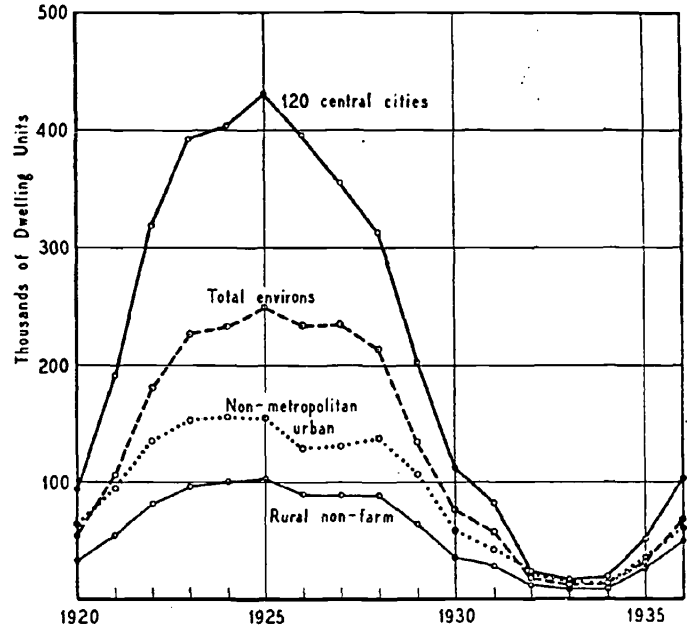
	1920-1924	1925-1929	1930-1936	1920-1936
One-family	2,001	2,270	791	5,062
Two-family	589	501	77	1,167
Apartments	586	1,088	239	1,913
Total	3,176	3,859	1,107	8,142
(percentage distribution)				
One-family	63.0	58.8	71.5	62.2
Two-family	18.6	13.0	6.9	14.3
Apartments	18.4	28.2	21.6	23.5
Total	100.0	100.0	100.0	100.0

dential building began to decline four years before the marked industrial decline in 1929, and that the rate of fall was somewhat faster than was generally recognized at that time.

TYPE OF STRUCTURE

Although residential building for the country as a whole reached its peak in 1925, the national totals obscure widely different turning points for the various types of dwelling. One-family dwellings usually are the first to be constructed after a long period in which little building has been done. This was true in 1920-24, following the War period during which there had been little private construction. It is also true at present, although the proportion of apartments constructed in 1936 was greater than in 1935. During the general rise in building activity in the early 1920's, single-

Chart 4  
NUMBER OF NEW DWELLING UNITS BUILT BY CLASS OF CITY 1920-1936



family houses were built in increasing number until 1925, then declined. The course of construction of two-family houses and apartments was quite different. The former reached a maximum as early as 1923 or 1924, whereas apartment building continued up to a maximum in 1927 and was the last to decline. During the 1930's two-family houses

TABLE 3  
NEW NON-FARM DWELLING UNITS BUILT, ESTIMATED NUMBER, 1920-1936  
(thousands of dwelling units)

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936
'A'—Type of Dwelling																	
One-family	202	316	437	513	534	572	491	454	436	316	185	147	61	39	42	110	207
Two-family	24	70	146	175	173	157	117	99	78	51	28	21	6	4	3	6	10
Apartments	21	63	133	183	186	208	241	257	239	142	73	44	7	11	10	28	65
Total	247	449	716	871	893	937	849	810	753	509	286	212	74	54	55	144	282
'B'—Class of City																	
1. 120 central cities	95	192	319	393	404	431	396	355	313	203	113	83	24	17	19	51	104
2. Environs: 2,500 and over	36	71	120	152	156	166	156	157	143	90	53	38	12	9	8	20	40
3. Environs: under 2,500	18	35	60	75	77	82	77	78	71	45	26	20	6	5	5	12	27
4. Total environs (2+3)	54	106	180	227	233	249	234	235	214	135	77	58	18	13	13	32	68
5. 96 metropolitan districts (1+4)	150	299	499	620	637	680	629	590	528	338	190	140	42	31	33	83	172
6. Non-metropolitan urban	64	96	135	153	156	155	129	131	138	107	59	43	20	14	13	35	61
7. Total urban (5+6)	214	395	633	773	793	835	759	721	665	445	249	184	62	45	46	118	232
8. Rural non-farm	33	55	82	97	100	103	90	89	88	64	36	28	12	9	9	26	50
9. Total non-farm (7+8)	247	449	716	871	893	937	849	810	753	509	286	212	74	54	55	144	282
'C'—Geographic Division																	
New England	11	20	37	45	53	60	45	44	45	28	15	14	5	4	3	4	10
Middle Atlantic	44	101	187	233	249	255	255	257	218	128	84	67	19	14	19	35	67
East North Central	50	74	134	181	191	192	186	178	160	110	37	19	5	3	4	17	37
West North Central	20	35	52	63	53	60	45	35	36	30	16	15	6	4	4	9	13
South Atlantic	37	57	83	91	106	118	101	85	81	49	29	29	13	9	9	36	58
East South Central	8	19	29	37	42	46	39	37	39	24	12	6	3	2	2	6	20
West South Central	33	56	66	66	59	64	56	63	68	59	37	24	8	7	6	16	32
Mountain	6	13	17	15	17	19	14	14	14	8	6	2	1	1	1	3	6
Pacific	38	74	111	140	123	123	108	97	92	67	48	32	13	10	7	18	39
Total	247	449	716	871	893	937	849	810	753	509	286	212	74	54	55	144	282

TABLE 4  
DISTRIBUTION OF THE NUMBER OF NEW NON-FARM DWELLING UNITS BUILT,  
BY CLASS OF CITY AND BY PERIOD, 1920-1936

	NUMBER-THOUSANDS			PERCENTAGE DISTRIBUTION <sup>1</sup>		
	1920-29	1930-36	1920-36	1920-29	1930-36	1920-36
120 central cities	3,102	411	3,513	44.1	37.1	43.1
Environs	1,867	280	2,147	26.5	25.3	26.4
Non-metropolitan urban	1,263	244	1,507	18.0	22.1	18.5
Rural non-farm <sup>1</sup>	803	171	974	11.4	15.5	12.0
Total non-farm	7,035	1,106	8,141	100.0	100.0	100.0

<sup>1</sup>Excludes rural towns, and villages (under 2,500 population) and unincorporated areas in environs of metropolitan districts, considered as urban.

have been much less commonly constructed than in earlier periods (see Chart 3).

Apartments require more elaborate financing and are usually built as investments. Building activity as a whole must be well under way and a broad demand for housing must be evident before such large multiple-unit structures are launched. Once they are begun, however, the financing and construction of others are likely to follow. Certain features of this type of building make its market less sensitive to consumer demand. The larger size, longer construction-time, and indirect financing all make for overbuilding once an active period of construction has begun.

In the country as a whole, more one-family dwelling units are built than any other type. During the last seventeen years they have constituted 62 per cent of the aggregate number of dwelling units built. Apartments are next in importance, with 24 per cent, and two-family dwellings last, with 14 per cent of the total. The proportions have shifted from time to time, as is shown in Table 2, which summarizes the number of units provided in different types of dwelling for several periods. Estimates of the number of dwelling units built each year since 1920 classified by type of dwelling are presented in Table 3, A, and Chart 3.

BUILDING ACTIVITY PREDOMINANTLY IN  
METROPOLITAN AREAS

Residential building during 1920-36 was predominantly concentrated in large metropolitan cities and their environs (see Chart 4). When residential construction for the period is classified by type of population center (Table 4), it appears that about 70 per cent was concentrated in the

96 metropolitan districts.<sup>a</sup> Of this 70 per cent, over half, or 43 per cent was concentrated in the 120 central cities of these metropolitan districts. The environs of the metropolitan cities were next in importance with over 26 per cent, although they averaged only 17 per cent of non-farm population. The rural non-farm areas (towns and villages under 2,500 and unincorporated areas not farms) had the lowest building rate, accounting for only 12 per cent of the total volume of building, although they had nearly 20 per cent of total population. These differences emphasize the importance of the rate of growth of population, as opposed to the total population as a determinant of building volume: the outskirts of the cities grew in population more than twice as fast as the entire country on the average during the decade 1920-29, while the rural non-farm areas grew less than any group of urban centers.

Building in the metropolitan areas shifted continuously from the large cities to the suburbs during most of the

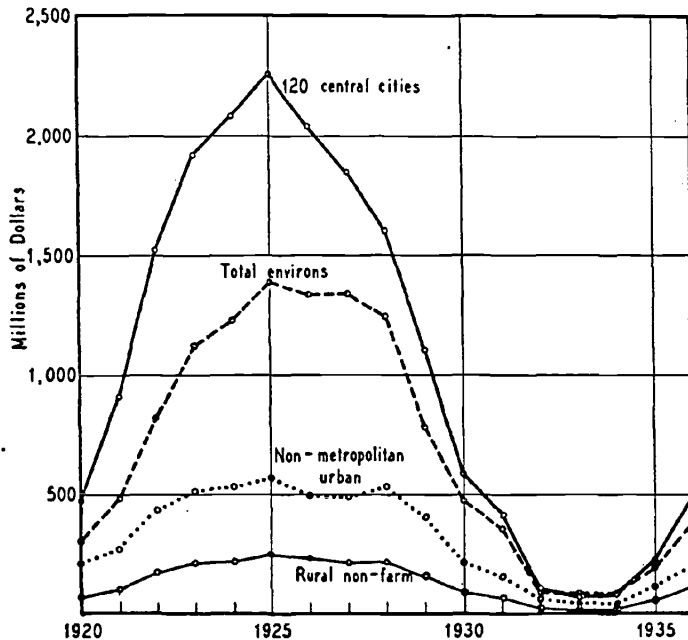
<sup>a</sup>A metropolitan district is defined by the Bureau of the Census as an "area within which the conditions of manufacturing, trade, transportation, labor, and living—in brief, the daily economic and social life are predominantly influenced by the central city." There are 96 districts most of which are in the northeastern part of the country. Each district has 100,000 or more population and includes not only a central city but also all the adjoining or nearby smaller cities and towns that constitute a part of the same urban area. For example, the Metropolitan District of Philadelphia in 1930 included not only Philadelphia city proper, containing 128 square miles and a population of 1,950,000, but also an area outside the city extending into four counties in Pennsylvania and three in New Jersey, covering 866 square miles and containing a population of 896,000.

TABLE 5  
DISTRIBUTION OF VALUE OF NEW NON-FARM RESIDENTIAL BUILDING,  
BY CLASS OF CITY AND BY PERIOD, 1920-1936<sup>1</sup>

	AGGREGATE VALUE (millions of dollars)			PERCENTAGE DISTRIBUTION		
	1920-29	1930-36	1920-36	1920-29	1930-36	1920-36
120 central cities	15,789	1,975	17,764	49.0	41.0	48.0
Environs	10,077	1,657	11,734	31.3	34.4	31.7
Non-metropolitan urban	4,457	812	5,269	13.9	16.8	14.2
Rural non-farm	1,876	375	2,251	5.8	7.8	6.1
Total non-farm	32,199	4,819	37,018	100.0	100.0	100.0

<sup>1</sup>Housekeeping units only.

Chart 5  
VALUE OF NEW DWELLING UNITS BUILT  
BY CLASS OF CITY  
1920-1936



period, as shown by the estimated number of new family units built each year since 1920 (Table 3, B). During the depression this movement extended into the rural non-farm areas. Building in non-metropolitan centers, that is those places not in metropolitan districts and above 2,500 in population, fluctuated less violently than in the metropolitan areas, and in recent years has been a larger proportion of the total than formerly. The majority of these non-metropolitan cities are in predominantly agricultural regions.

VALUE OF NEW RESIDENTIAL CONSTRUCTION,  
BY CLASS OF CITY

The value of new residential construction in the respective classes of cities is distributed in much the same way as the number of units. Value of new housekeeping units built in the metropolitan districts accounted for 80 per cent of the total during the seventeen years (see Table 5), as

compared with 70 per cent of the total number of units. The value of dwellings built in the several groups of cities each year since 1920 is shown in Chart 5 and Table 6.

Between the different classes of cities there are wide differences in the average costs of new dwelling units built. For example, unit costs in the urban environs, i.e., places of more than 2,500 in population in environs of large cities, averaged from two to three times as high as costs in the rural non-farm areas (Chart 6).

Although the cost of building materials declined from 1920 to 1929 and fell much more rapidly during the depression, the average cost of dwelling units built in central cities changed little. In the other groups of cities average costs per unit built increased from 1920 to 1929, but declined during the depression. During 1933-35 average dwelling costs in the urban environs appear to have been higher than in the period of active building in the 1920's. Among the causes for these differences is the relatively lower average cost of all new units built in the urban environs in the 1920's because a larger proportion consisted of apartments and two-family dwellings, for which the cost per unit averages lower than for one-family dwellings. During the depression, building of apartments and two-family dwellings declined sharply in the urban environs, and a greater proportion of the small amount of construction done in those areas took the form of relatively expensive one-family dwellings.

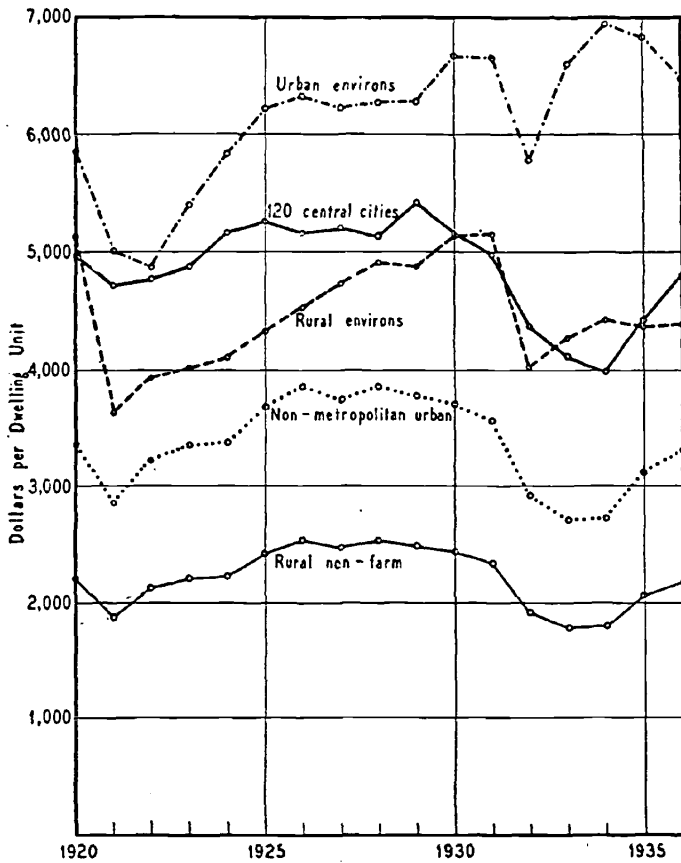
REGIONAL DIFFERENCES IN BUILDING ACTIVITY

Construction of new residences is essentially a local industry even though some of or all the materials may come from long distances. Local demand for new housing accommodation depends not only upon the change in the population already settled in the area but also on factors that lead people to move from one part of the country to another—trade, industry, education, recreation. In the past, immigration has also been an important factor in determining the location and character of new construction. Replacements have been of minor importance in the total housing demand.

TABLE 6  
NEW NON-FARM RESIDENTIAL BUILDING, ESTIMATED AGGREGATE VALUE,  
BY CLASS OF CITY, 1920-1936  
(millions of dollars)

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936
HOUSEKEEPING UNITS ONLY																	
1. 120 central cities	475	910	1,524	1,924	2,086	2,263	2,043	1,851	1,612	1,102	585	412	106	71	77	225	499
2. Environs: 2,500 and over	213	356	589	821	911	1,036	989	978	899	569	345	254	68	57	58	139	261
3. Environs: under 2,500	92	128	235	301	316	356	351	368	348	219	132	102	25	21	21	53	120
4. Total environs (2+3)	305	484	824	1,122	1,228	1,392	1,340	1,347	1,248	787	477	356	93	78	80	192	381
5. 96 metropolitan districts (1+4)	780	1,394	2,348	3,046	3,314	3,655	3,383	3,198	2,859	1,889	1,063	768	199	149	157	417	881
6. Non-metropolitan urban	214	274	434	513	528	570	499	492	530	404	218	153	57	38	36	109	200
7. Total urban (5+6)	994	1,668	2,782	3,559	3,842	4,225	3,882	3,689	3,389	2,293	1,280	921	256	187	193	526	1,081
8. Rural non-farm	74	104	175	216	223	250	230	221	223	160	89	66	23	16	17	54	109
9. Total non-farm (7+8)	1,068	1,771	2,957	3,775	4,065	4,475	4,112	3,910	3,613	2,453	1,369	987	279	203	210	580	1,191
NON-HOUSEKEEPING UNITS																	
	54	70	157	206	179	279	202	154	200	171	86	17	3	2	3	5	11
TOTAL NEW RESIDENTIAL	1,122	1,841	3,115	3,980	4,244	4,754	4,314	4,064	3,813	2,623	1,456	1,005	282	204	214	585	1,202

Chart 6  
AVERAGE COST OF CONSTRUCTION PER DWELLING UNIT, BY CLASS OF CITY 1920-1936



A large proportion of the residential building during the period covered by these estimates was concentrated in relatively small sections of the country. More than half of the total number of family units were built in the industrial northeast, while three-fourths were in the three areas represented by that area and the seaboard cities of the South Atlantic and Pacific regions. In 1920-36 more families were provided for in the Middle Atlantic states than in any of the other nine geographic areas. Building in New York City accounted for nearly one-half of new construction in this region. The East North Central states, including Ohio, Indiana, Illinois, Wisconsin and Michigan, were second in volume of activity, and the Pacific states third (see Table 7 and Chart 7).

The importance of population movements to new building is illustrated by the wide differences in the west and east coast areas during 1920-29. The Pacific states, in which the non-farm population averaged 7 per cent of the United States total, built nearly 14 per cent of all the new residences constructed during the decade, reflecting an increase of 55 per cent in the area's population. In contrast, the New England region, which had about 9 per

TABLE 7  
PERCENTAGE DISTRIBUTION OF NEW NON-FARM DWELLING UNITS BUILT, BY GEOGRAPHIC DIVISION AND BY PERIOD, 1920-1936

	Percentage's of total number		
	1920-1929	1930-1936	1920-1936
New England	5.5	5.0	5.4
Middle Atlantic	27.4	27.6	27.4
East North Central	20.7	11.0	19.4
West North Central	6.1	6.0	6.1
South Atlantic	11.5	16.5	12.2
East South Central	4.6	4.6	4.6
West South Central	8.4	11.8	8.8
Mountain	2.0	2.4	2.1
Pacific	13.8	15.1	14.0
Total	100.0	100.0	100.0

cent of the population, accounted for less than 6 per cent of total building, the population having increased only 12 per cent.

The aggregate volume of building during the 1920's and early 1930's varied considerably between regions. In both periods the Middle Atlantic states held the same relative position, with 27 per cent of the total. The East North Central states, which had 21 per cent of the building in the 1920's, had only 11 per cent in the 1930's. The Pacific area had 14 and 15 per cent respectively, while the proportion in the South Atlantic area increased from 11 to 16 per cent. The striking drop in the relative position of the East North Central states during the 1930's was due largely to the almost complete cessation of building in Chicago, Detroit and Cleveland during the depression.

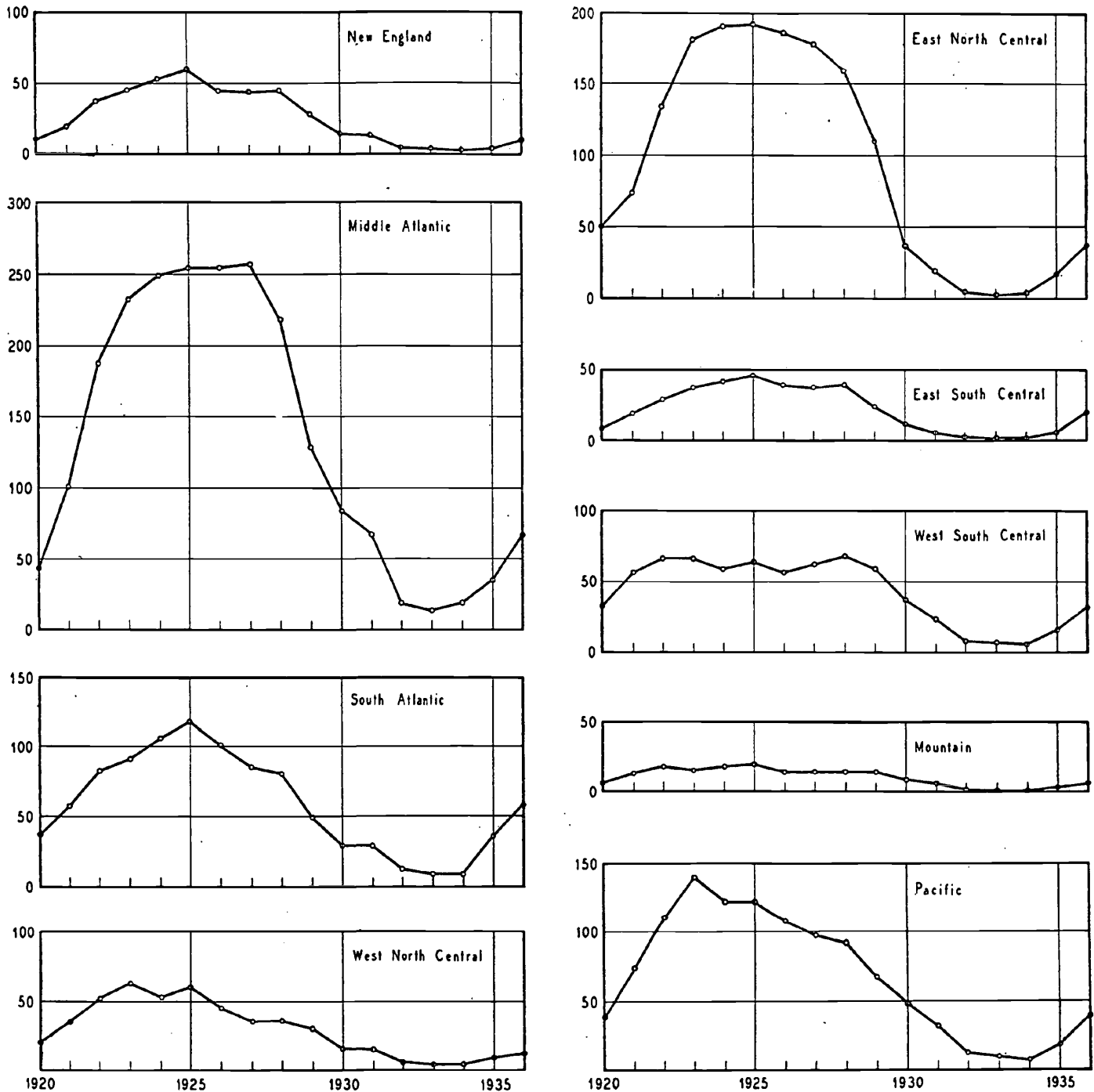
The timing of active building in various localities has differed so widely during the last seventeen years that its discussion in terms of the construction industry in the United States as a whole is often misleading, since it implies that the operations are those of a single industry rather than of many widely scattered industries that operate independently. For example, while the estimated total of residential construction for the country reached a peak in 1925, construction in the Pacific states was at its height two years earlier. From 1923 to 1934 it declined almost continuously. Building in the Middle Atlantic region increased from 1920 to 1927, not beginning its decline until four years later than in the Pacific region and two years after that for the nation as a whole (see Table 3, C and Chart 7).

RESIDENTIAL CONSTRUCTION IN INDIVIDUAL CITIES

Individual cities show much more irregular variations in building activity than the geographic regions. These wide differences in the general trend and in the year-to-year changes in home construction are illustrated by the record of twenty-five cities given in Chart 8, showing the number of families provided for by residential building permits obtained annually from 1920 to 1936. The influences on construction in individual cities are as diverse as local eco-



Chart 7  
 NUMBER OF NEW DWELLING UNITS BUILT, BY GEOGRAPHIC DIVISIONS 1920 - 1936  
 THOUSANDS OF DWELLING UNITS



conomic conditions. The building booms of Miami and Los Angeles are notable examples of great local activity, little related to construction elsewhere. In Miami about 1,000 dwelling units were built in 1922; at the peak in 1924-25 nearly 10,000 units were built each year; and by 1928 there was practically no construction. At present, building is again active in Miami, about 2,000 units having been

constructed in 1936. The Los Angeles boom reached a peak in 1923 with 44,000 units, declined to 20,000 by 1926, and to 2,000 by 1934. This decline was more gradual because of the diversity of industrial activity there. Now Los Angeles is again building at a rapid rate, with 9,000 units in 1936, and a rate in 1937 among the highest in the country.

Oklahoma City reached a building peak in 1929, reflecting the development of oil fields in that territory, declined to nearly zero in 1933-34, and in 1936 regained a level equal to its average for the 1920's. Washington, D. C. attained a building peak in 1925-26 with about 8,000 units per year, declined to 1,000 in 1933, and rose to 6,500 in 1936, approaching the former peak.

#### LONG TERM COMPARISONS OF RESIDENTIAL BUILDING VOLUME

Limitations of the data available for earlier years make it impossible to extend the present detailed estimates to years preceding 1920. However, some comparison of building during the last seventeen years and earlier years is possible. Residential contracts awarded in from twenty-five to twenty-seven eastern states during 1915-19, apartment construction in New York City since 1902, building permits as reported by Dun and Bradstreet and the United States Geological Survey, and other series indicate that the increase in building in the early 1920's was the continuation of a movement that started from a low level in all regions in 1918. The maximum volume of residential building was attained from five to nine years later, in individual regions. Fifteen years later, in 1933, building was again at low levels in all parts of the country.

While building permits compiled prior to 1920 do not segregate home building from other types, residential construction was a sufficiently large part of the total to make possible reasonably accurate deductions concerning its volume and trend. In many of the large eastern cities building rose sharply in 1919 but declined in 1920, largely owing to the effect of extremely high costs. However on the West Coast and in parts of the South there was little or no interruption to the increase in either physical or dollar volume from 1918 until 1922-23.

The available data indicate that the range of fluctuations in total building from the low in 1918 to the peak in 1925 and again down to the extremely low levels of 1933-34 was greater than in any previous period.<sup>9</sup> The fluctuations on a dollar volume basis were considerably greater than in the number of units built, largely because of the changes in building costs. In terms of the total number of dwelling units built the average level of building in the 1920's was higher than in earlier periods for several reasons: the increase in the number of non-farm families to be housed during 1920-30 was 5½ million as compared with 3½ to 4 million in the preceding two decades, and approximately

<sup>9</sup> See I. R. Riggelman, 'Building Cycles in the United States, 1875-1932', (1931) *of the American Statistical Association*, June 1933; Carl Snyder, *Business Cycles and Business Measurements* (Macmillan, 1927); V. H. Newman, *The Building Industry and Business Cycles* (University of Chicago Press), Vol. V, No. 4, July 1935; Homer Hoyt, *One Hundred Years of Land Values in Chicago* (University of Chicago Press, 1933).

2½ million during 1890-1900. Building to replace losses was probably higher in 1920-30 than in earlier periods owing partly to the increasing average age of dwellings, but largely because of the rapid rate of demolition of structures with some remaining years of usefulness, to make way for other buildings. Also, owing to the curtailment of residential building during the War, a housing shortage had developed. The additional building thus required during the 1920's would normally have occurred during the preceding decade. The shortage was eliminated and an excess of units was built in many areas by 1930. All these factors contributed to the high average level of building during the 1920's, and together with changes in family income levels, ability to finance, and other factors, tended to increase greatly the amplitude of fluctuations in residential building<sup>10</sup> since the War.

## II

It has not been possible to include in this *Bulletin* the extensive tables and considerable body of supporting data necessary to present the detailed methods used in obtaining the estimates summarized in Section I. These data will later be published separately. Consequently, the statement of method is confined to an outline of the principal steps involved:

1. Examination of the sample data for representativeness;
2. Estimate of the aggregate number of non-farm dwelling units built during the decade 1920-29 inclusive, in detail by geographic division, class of city, and type of dwelling;
3. Estimate of the number of dwelling units built each year since 1920, based on the relationships found in 2, and other data;
4. Estimate of the value of new residential building each year since 1920, by applying average costs per dwelling unit to the estimated number of units built.

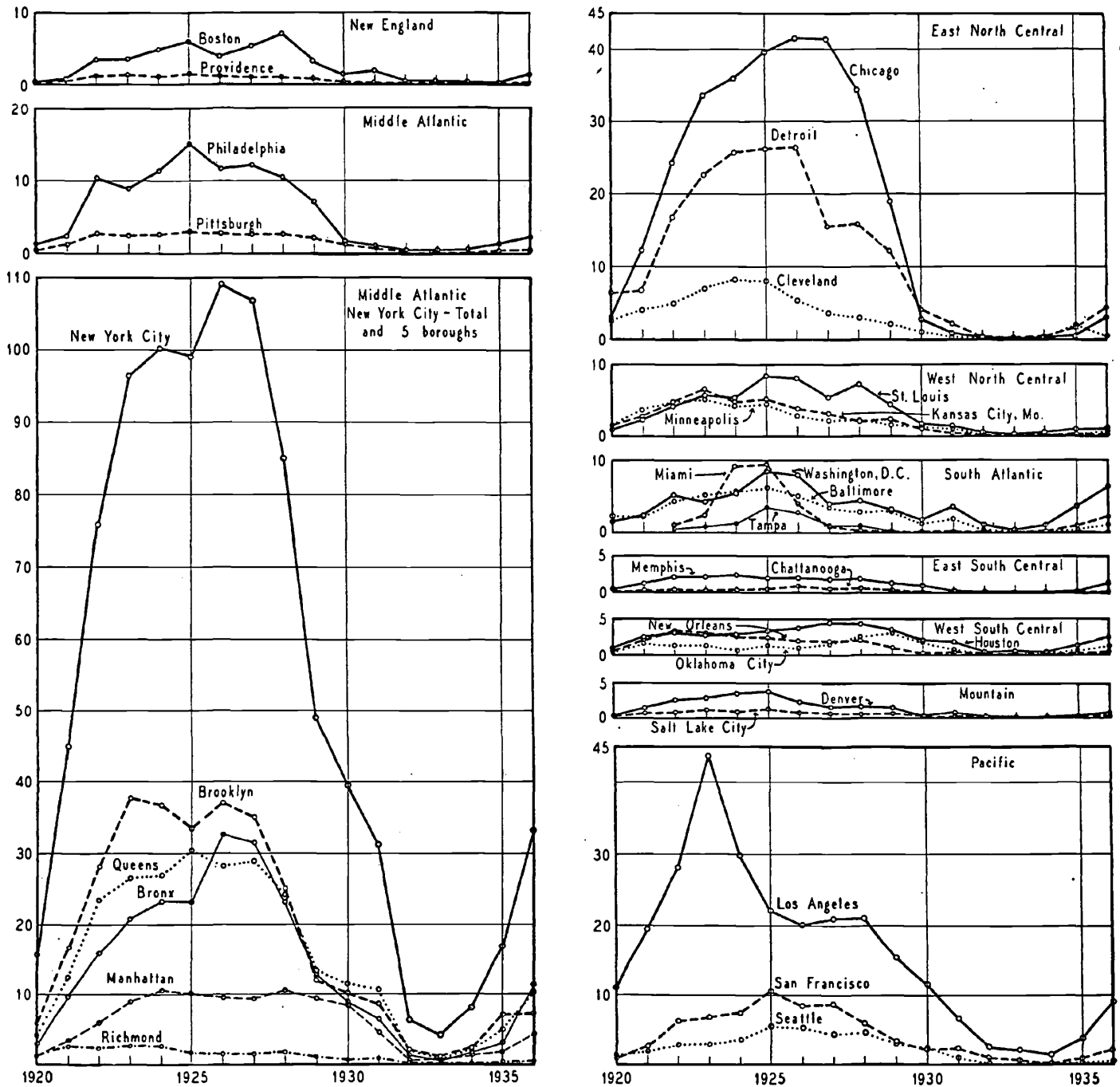
#### REPRESENTATIVENESS OF PERMIT DATA

The present estimates are based primarily on reported building permits for principal cities of the United States as published by the Bureau of Labor Statistics since 1920,<sup>11</sup> in connection with data on change in number of families. The number of cities reporting building permit data has ranged from 189 in 1920 to 1,689 in 1936. Throughout most of the period 1920-32 each of the reporting cities had a popu-

<sup>10</sup> A theoretical analysis of this tendency for certain factors influencing building to increase rather than diminish the amplitude of changes in the volume was made recently by A. F. Burns, 'Long Cycles in Residential Construction', *Economic Essays in Honor of Wesley Clair Mitchell* (Columbia University Press, 1935), pp. 63-104.

<sup>11</sup> 'Building Permits in the Principal Cities of the United States,' *Bulletins* 295, 318, 347, 368, 397, 424, 449, 469, 500, 524 and 545; *Monthly Labor Review*, March and April 1932, March and April 1933, and April 1934; 'Building Construction', Serial Nos. R-219, R-351 and R-538.

Chart 8  
 NUMBER OF FAMILIES PROVIDED WITH NEW DWELLING UNITS, 25 CITIES, 1920-1936  
 THOUSANDS OF DWELLING UNITS



lation of 25,000 or more. During 1933-35 reports were received from 811 to 819 cities above 10,000 in population, and each of the 1,689 cities reporting in 1936 had a population of 2,500 or more.

Principal reliance was placed on a consistent series for 257 identical cities having more than 25,000 population and reporting continuously since 1921; data for 1920 were estimated on the basis of the 189 cities reporting that year. For 1935 and 1936 the enlarged samples of 811 and 1,689

cities then available also were used in combination with the data for the 257 cities.

The 257 reporting cities accounted for about one-half of the total non-farm population, or approximately two-thirds of the population in centers with 2,500 or more, usually designated as urban. Thus, for estimating non-farm building, the problem was to determine the amount of building in areas having in the aggregate approximately half the total non-farm population.

In order to establish rates of change in population and building for different classes of cities, the 257 cities were classified into three groups, based on their location within, or outside, metropolitan districts as follows:

- (1) 113 of the 120 central cities included in the 96 metropolitan districts as defined by the Bureau of the Census, the cities varying in size from 25,000 to more than 6,000,000 in population;
- (2) 64 satellite cities of from 25,000 to 116,000 population in the environs of 14 of the 96 metropolitan districts, with 33 of the 64 cities in the environs of New York City and Boston, and none in the environs of central cities in the South, West Central or Mountain regions;
- (3) 80 non-metropolitan cities with 25,000 to 100,000 population. The representation of these groups of cities in terms of population in 1920 and 1930 is shown in Table 8 and Charts 9 and 10. It is significant that the rates of growth of the unreported urban areas are considerably greater than those of the corresponding groups of reporting cities. Since residential building is correlated with the rate of growth of cities, it is important in making estimates that building rates reported in the sample of 257 cities be related to the varying rates of growth in the unreported areas.<sup>12</sup>

#### ESTIMATE OF THE NUMBER OF DWELLING UNITS BUILT, 1920-1929

The method adopted to estimate the aggregate volume of building during the decade 1920-29 was based directly on the Census data on families, utilizing ratios of the number of dwelling units built to the increase in number of fami-

<sup>12</sup>In the early stages of this study the method of computing per capita building rates in cities reporting building figures, and applying these rates to the population of unreported areas, was used to estimate the total number of dwelling units built in the decade 1920-29, distinguishing between metropolitan, non-metropolitan and rural non-farm areas. The per capita building rate to be applied to an unreported area was selected from the regression line derived in a correlation for the corresponding group of reporting cities, determining the relation of (a) families provided for per 10,000 population during the decade 1920-29; (b) percentage increase in population between Census dates 1920 and 1930. (This is the general principle used recently by F. J. Hallauer to estimate the volume of building during 1920-29, *Population and Building Construction, Journal of Land and Public Utility Economics*, February 1934; and *Population and Building Construction, a Revision, Journal of Land and Public Utility Economics*, February 1936, and anticipated by W. I. King and Maurice Leven in 1924, *Population Growth and Building, Journal of American Statistical Association*, Vol. XIX, 1924 and the Federal Trade Commission in its report, 'The National Wealth and Income' (1926), p. 368.) A high degree of correlation was shown between building rates and population increase, almost entirely independent of size of city or geographic location. However, the method proved too unwieldy to apply on a regional basis, besides having other disadvantages, and its use was restricted to 1935 and 1936.

lies in cities reporting building permits, and applying these ratios or modifications of them to the increase in number of families in areas not covered by building permits.<sup>13</sup> The nature and application of these ratios may be illustrated as follows: it was estimated that 7,035,000 non-farm dwelling units were built in the decade 1920-29, which roughly matches the intercensal period January 1, 1920 to April 1, 1930, during which period Census data show a net increase of 5,541,000 in the number of non-farm families. The indicated ratio of number of units built to the increase in number of families is 1.27; in other words, for an increase of 100 families, approximately 127 units were built. The additional 27 units are accounted for as follows: By definition, the Census enumeration of families is also a count of the occupied dwelling units. The total number of all units standing, including those unoccupied, was not enumerated by the Census, and hence had to be estimated. When these vacant units in 1920 and in 1930 are added to the Census count of families (occupied dwellings) in 1920 and 1930 respectively, the net increase in the number of all units standing was over 6,580,000, of which 1,039,000 were vacant units. These 1,039,000 units may be apportioned roughly in three parts among: (a) building to make up the housing shortage that had accumulated at the beginning of the decade 1920-30; (b) building to provide a nominal vacancy accompanying the 5,541,000 increase in the number of occupied units; (c) excess building which resulted in greater than normal vacancy by 1930.

In addition to providing for the estimated increase of nearly 6,580,000 units in the total of all units standing, the building necessary to replace dwellings demolished to make way for other buildings, or by fire, flood and other causes was estimated to be 580,000 units, which, added to the 6,580,000 net increase in units standing would indicate a gross volume of building of 7,160,000 units. However, when allowance is made for the net increase in number of units from remodeling and conversion of many existing buildings, the net *new* construction for the decade is indicated to be only 7,035,000 dwelling units.

The ratio of the number of units built to the increase in the number of families, 1.27 for the entire non-farm area, is higher for large cities than for small towns for several reasons: (a) The additional building required to maintain a 'normal' vacancy tends to be relatively greater in the large cities, mainly because of the large number of apartments, in which vacancies usually average much higher than in one-family dwellings, which predominate in small communities. During 1920-30 the percentage increase in vacancy was greater in apartments than in other types.

<sup>13</sup>This method rather than use of per capita building rates was the outgrowth of conversations with George Terborgh, to whom acknowledgement is due for many helpful suggestions made during the progress of this study.

(b) Building to replace dwellings demolished because of encroachment of business sections on residential areas, physical deterioration, or other causes is proportionately greater in large cities. In a new residential area outside city limits, building to replace demolitions would be virtually nil, and new construction generally would be in the proportion of one unit to each family moving into the area, since in most cases the moving of the family into the area would depend on the completion of a dwelling unit to accommodate it. (c) The majority of the largest cities, except Los Angeles, Detroit, and Queens and Bronx boroughs in New York City, have been growing more slowly

TABLE 8  
POPULATION OF 257 CITIES REPORTING BUILDING PERMITS, AND CORRESPONDING UNREPORTED  
URBAN AND NON-FARM AREAS, BY CLASS OF CITY, 1920 AND 1930<sup>1</sup>

	POPULATION			
	1920 <sup>2</sup> Jan. 1 000's	1930 April 1 000's	INCREASE 1920-30 PER CENT	DISTRIBUTION 1930 PER CENT
<b>METROPOLITAN DISTRICTS</b>				
113 reporting central cities <sup>3</sup>	30,913	37,253	20.5	40.3
7 unreported central cities <sup>4</sup>	394	562	42.6	0.6
120 central cities	31,307	37,815	20.8	40.9
64 reporting satellite cities <sup>5</sup>	3,024	3,810	26.0	4.1
Unreported urban environs	4,667	7,517	61.1	8.1
Total urban environs (population 2,500 and over) <sup>6</sup>	7,691	11,327	47.3	12.2
Rural environs (population under 2,500)	3,682	5,612	52.4	6.1
Total environs	11,373 <sup>7</sup>	16,939	48.9	18.3
177 reporting metropolitan district cities	33,937	41,063	21.0	44.5
Unreported metropolitan district areas	8,743	13,690	56.6	14.8
Total 96 metropolitan districts	42,680	54,753	28.3	59.3
<b>NON-METROPOLITAN CITIES</b>				
80 reporting non metropolitan cities	3,351	3,846	14.8	4.2
Unreported non-metropolitan cities	12,791	15,967	24.8	17.3
Total non-metropolitan cities	16,142	19,813	22.7	21.5
<b>ALL URBAN AREAS</b>				
257 reporting cities	37,288	44,909	20.6	48.6
Unreported urban areas	21,534	29,658	37.7	32.2
Total urban <sup>8</sup>	58,822	74,567	26.8	80.8
RURAL NON-FARM <sup>9</sup>	15,274	17,763	16.3	19.2
TOTAL NON-FARM	74,096	92,330	24.6	100.0

<sup>1</sup>'Reporting cities' are those in the Bureau of Labor Statistics series of 257 identical cities.

<sup>2</sup>'Unreported areas' are cities or unincorporated areas not in the 257 cities.

<sup>3</sup>Population of reporting cities includes estimated 1920 population of areas annexed during 1920-30, to obtain comparable areas on 1930 basis.

<sup>4</sup>In 91 of 96 metropolitan districts.

<sup>5</sup>In 5 metropolitan districts: Evansville, Ind., Johnstown and Reading, Pa., Miami, Tampa, and St. Petersburg, Fla., and Ashland, Ky.

<sup>6</sup>In 14 of 96 metropolitan districts.

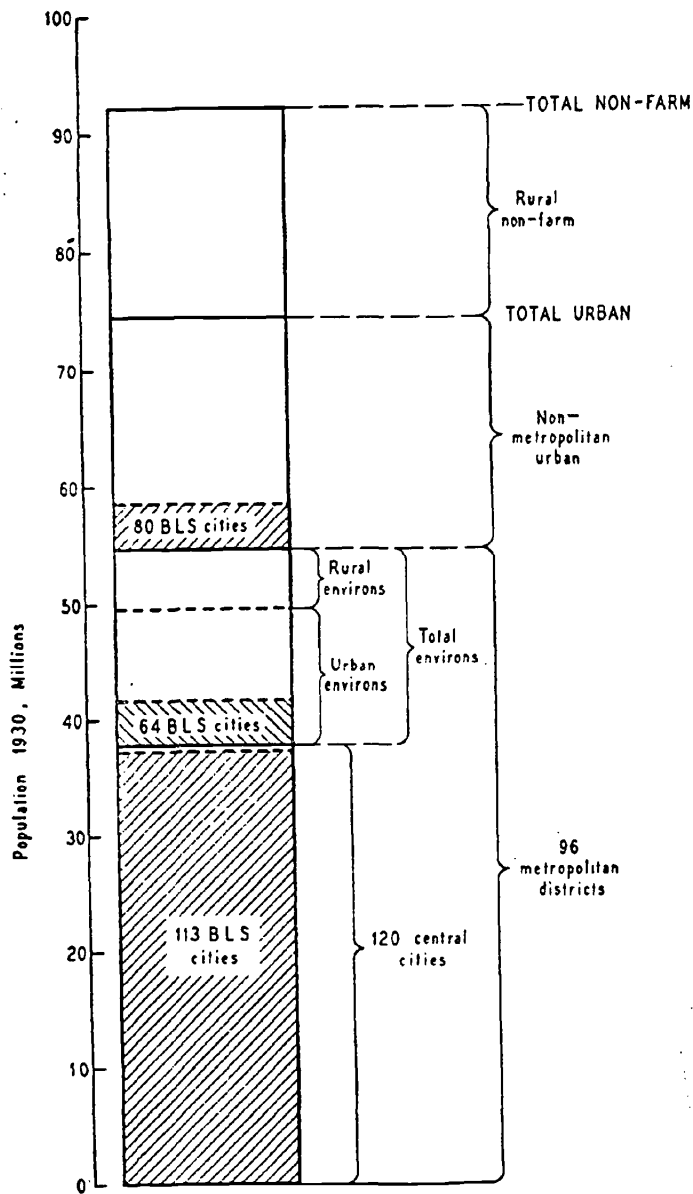
<sup>7</sup>Obtained by combination of special tabulations of population of satellite cities 2,500-25,000 (furnished by Division of Construction and Public Employment, U. S. Bureau of Labor Statistics) and satellite cities 25,000 and over (by National Bureau of Economic Research).

<sup>8</sup>Partly estimated. Census data available for environs of only 85 metropolitan districts in 1920.

<sup>9</sup>National Bureau of Economic Research classification: includes places under 2,500 in environs normally classified as 'rural' but considered as urban for estimating building. Census total 1930: 68,954,823; 1920 total for identical areas on 1930 classification: 55,140,358 (special tabulation of unpublished data, U. S. Bureau of the Census).

<sup>10</sup>National Bureau of Economic Research classification: excludes places under 2,500 in environs of metropolitan districts.

Chart 9  
REPRESENTATION OF NON-FARM POPULATION, 1930, BY 257 CITIES REPORTING BUILDING PERMITS



than the smaller cities, consequently building on account of demolitions and vacancy change in the large cities would be larger relative to the absolute increase in number of families.<sup>24</sup>

These differences to be expected in the ratios of units built to increase in number of families are found in the 1920-29 data for the various classes of the 257 cities to be:

113 central cities	1.415
64 satellite cities	1.279
80 non-metropolitan cities	1.182

Estimates of the number of dwelling units built in each class of city were made separately for the nine geographic

divisions, ratios for the unreported areas being assigned on the basis of the most nearly representative group of reporting cities. The major portion of the estimates were based on ratios under 1.200 and approaching 1.000, the equivalent of one new dwelling unit for each new family. The resulting aggregates for 1920-29 for the United States may be summarized thus:

	RATIO OF UNITS BUILT TO		
	INCREASE IN NUMBER OF FAMILIES	INCREASE IN NUMBER OF FAMILIES	NUMBER OF UNITS BUILT
	000's		
120 central cities	2,192	1.415	3,102
Urban environs	1,016	1.227	1,247
Rural environs	537	1.148	616
Non-metropolitan urban	1,087	1.166	1,267
Rural non-farm	710	1.132	803
Total non-farm	5,541	1.270	7,035

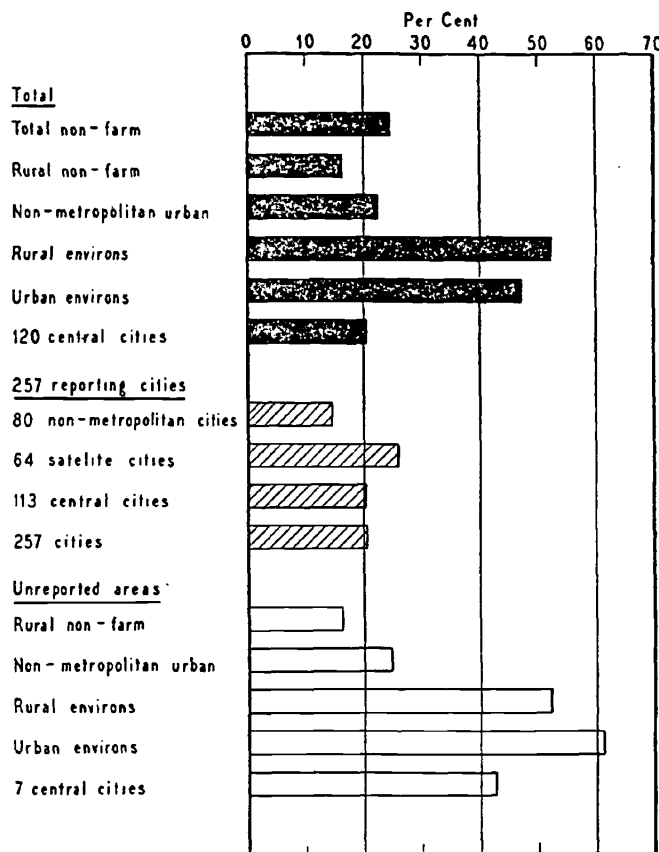
The principal adjustments to the basic data, which were necessary prior to obtaining the above estimates, were:

- (1) Estimate of the distribution of the number of urban families in 1920 and 1930 within and outside metropolitan districts by regions. (Census data for metropolitan districts are on a population basis only.)
- (2) Estimate of the increase in number of families, 1920-30, on comparable areas involving:
  - (a) Inclusion of quasi-families (living in hotels, institutions, etc.) in 1930 to match population data and 1920 family data; later reduced to private family basis since estimates are for housekeeping units.
  - (b) Adjustment of 1920 population and family data, to include population of areas annexed between 1920 and 1930, affecting 121 of the 257 reporting cities.
- (3) Correction of building data in reporting cities because of:
  - (a) Increased coverage due to annexations in 121 cities.
  - (b) Lapsed permits, principally for apartments in New York City.<sup>25</sup>
- (4) Estimate of building volume in reporting cities for certain years:
  - (a) For 66 small cities in which family unit data were not available in 1920, and for 22 cities in which data were incomplete in 1920. Total volume thus estimated amounted to 12.8 per cent of the 1920 total, but only 0.4 per cent of the 1920-29 total for the 257 reporting cities.
  - (b) For 7 central cities not included by the U. S. Bureau of Labor Statistics in the 257-city list because reports were lacking in one or more years. Estimates were made

<sup>24</sup>This would be true of any city having a low rate of growth regardless of size. If the number of families were to reach a maximum and the net increase in number of families become zero, the present method would not be applicable.

<sup>25</sup>Acknowledgment is due James Taylor of the Federal Housing Administration for suggestions as to this correction.

Chart 10  
INCREASE IN POPULATION, 1920-1930,  
REPORTING CITIES AND UNREPORTED AREAS  
BY CLASS OF CITY



for missing years on the basis of the trend in adjacent cities. The number of units so estimated amounted to only 0.3 per cent of the volume for all 120 central cities. The chief advantage of including these data is that representation is given Miami, Tampa, and St. Petersburg, cities prominent in the Florida boom. Jacksonville, the only Florida city included in the 257 cities, was not representative.

ESTIMATED NUMBER OF DWELLING UNITS BUILT  
ANNUALLY, 1920-1936

The number of units built each year was obtained in two steps: first, preliminary totals of the number of units built in each class of city each year in the period 1920-36 were projected from the data for the 257 cities in the same proportions as indicated by the 1920-29 ten-year aggregates (see (a) below); second, these preliminary totals were corrected for the downward bias in the 257-city series (see (b) below).

(a) Preliminary totals

Data on the number of units built in the 120 central cities, comprising reported data for the 113 central cities in the 257-city list, and the data for the additional 7 central

cities (partly estimated) required no further estimating.

Total building in the environs was derived by averaging two estimates made as follows: the first projected the trend of the 64 satellite cities by multiplying the reported number of dwelling units built in the 64 cities each year by 5.875.<sup>16</sup> The second estimate utilized the trend of building in all 184 of the reporting cities, both central and satellite cities in metropolitan districts, multiplying by 0.545.<sup>17</sup> Building in the urban and rural environs was estimated as 66.9 per cent and 33.1 per cent respectively of the total for all environs, based on the proportions shown in the 1920-29 aggregates. Building in non-metropolitan urban areas was estimated on the basis of the 80 reporting cities in this class. The trend of building in the rural non-farm areas was derived by averaging two estimates based on: (1) the 80 non-metropolitan cities; (2) total urban building.

The use of this method involves the assumption that for any homogeneous group of cities, the volume of building in the unreported areas outside the reporting cities follows the trend of building in the reporting cities year by year. This assumption appears to be valid when the cities are grouped as above, and when correction is made for the bias in the series of data for the respective groups of cities in the 257 reporting cities. This assumption would not be valid, if the combined trend for all the reporting cities were applied to the entire unreported non-farm area as a unit, as will be shown under (b). The year-to-year trend of building outside some individual cities likewise may differ considerably from that within the city. However, for groups of cities within reasonably large areas such as metropolitan districts, building in the environs generally follows that in the central city fairly closely. For example, the year-to-year building trends of the 14 reporting satellite cities in the Boston metropolitan district, taken individually, apparently had little relation to one another or to the trend in Boston, 1920-36, but the combined annual totals of the 14 cities, representing a sizeable sample of the environs, followed the trend in Boston. Similarly, in the environs of Providence, New York City and Philadelphia, the trend for each group of reporting satellite cities conformed to that of its central city. Similar relationships are found in data on new residential construction in 31 metropolitan districts as given in the 1934 Real Property Inventory of 64 cities; also, examination of building data for cities responding to much the same general economic conditions and rates of growth, even though in separate states, show close similarity in building trends. Thus the assumption that building in unreported

<sup>16</sup>Relation of number of units built in all environs to number of units built in 64 reporting satellite cities, 1920-29.

<sup>17</sup>Relation of number of units built in all environs to number of units built in 184 reporting central and satellite cities.

areas followed the trend of reporting cities appears to be applicable to areas that are homogeneous with respect to the factors influencing building. For these reasons estimates of year-to-year trends by metropolitan and non-metropolitan areas are probably more accurate than those made by regions.

(b) Correction for bias

The downward bias in the 257-cities series arose from the fact that building permits, restricted to areas within city limits, did not reflect the increasingly greater activity in the environs. Evidence of this bias is found in estimates of total non-farm building based on the augmented samples of cities in 1935 and 1936. The volume of all building outside the 257 cities increased during the depression to about two and one-half times that within the cities, in contrast to an average of about two times during 1920-29. This bias was continuous throughout the seventeen years, though to a much lower degree prior to 1928-29, as indicated by data for 31 metropolitan districts included in the Real Property Inventory of 64 cities, made in 1934. On the basis of these several sets of data, a number of factors were derived for correcting the preliminary annual totals described under (a) above. The percentage corrections are smallest in the years of greatest activity in the middle 1920's, and most pronounced during the depression when absolute volume was low.

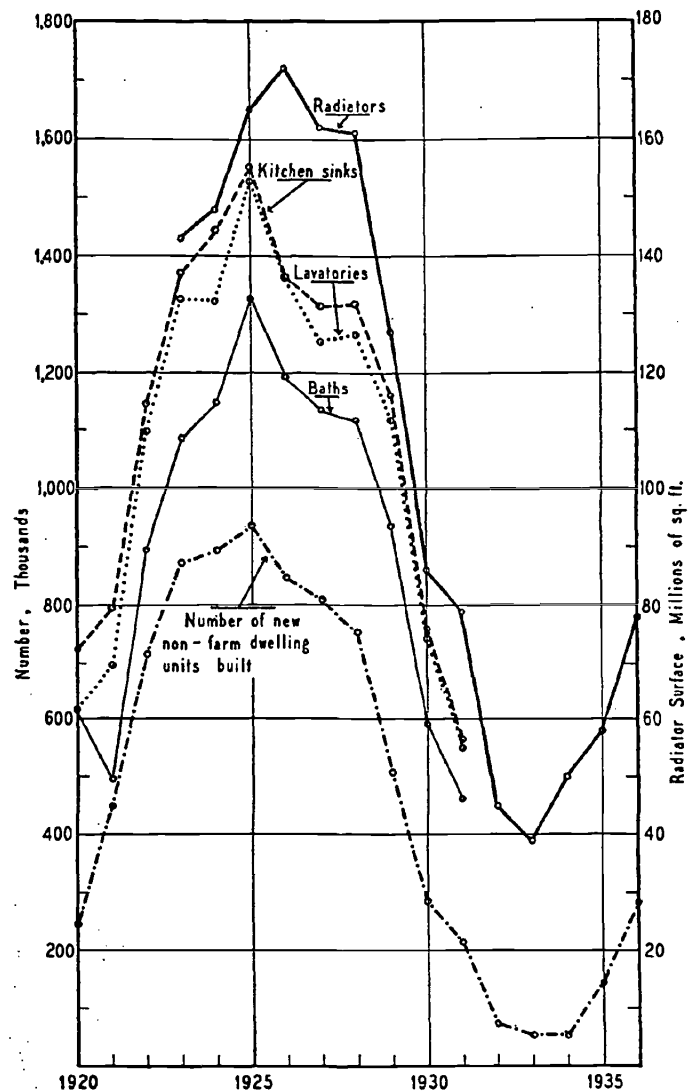
The preliminary totals of non-farm units built were multiplied by the correction factors mentioned above to obtain the corrected non-farm totals, except in 1935 and 1936 when the estimates based on 811 and 1,689 cities were used. Since virtually all the central cities were covered by the permit reports, their estimated building would not be affected, but the estimates for building in the outside areas required adjustment so that the total would equal the corrected non-farm totals. In the absence of conclusive evidence to the contrary, it was assumed that the adjustment for each year applied equally to all the areas outside the central cities for 1920-30, but additional adjustments were made for 1931-36, on the basis of detailed estimates for 1936, made possible by the sample of 1,689 cities.

These estimates thus present the volume of building annually in five segments of the non-farm areas, reflecting the separate trends shown by sub-groups of the 257 cities, yet correcting for the tendency of building to shift outward from the large cities.

COMPARISON OF TREND WITH SHIPMENTS OF MATERIALS

As a check on the estimated trend of non-farm units built, comparison was made with other available measures of physical volume of residential building, including shipments of bathtubs, lavatories and kitchen sinks (Chart 11). The similarity of the trends is quite marked. Though a considerable volume of baths, sinks and lavatories went

Chart 11  
FACTORY SHIPMENTS OF RADIATORS, KITCHEN SINKS, LAVATORIES, AND BATHS COMPARED WITH NUMBER OF DWELLING UNITS BUILT



into replacements, non-residential buildings, modernization of old dwellings in cities, and in farm dwellings as well, the data on shipments appear to confirm the trend of the present estimates of the number of non-farm units built.

The trend of radiator shipments differs from that of all non-farm units built because relatively more are used in apartments, hotels, office buildings, schools and other non-residential structures, than in small dwellings. Radiator shipments reached a peak in 1926 and remained at high levels in 1927 and 1928. This movement resembled the trend of apartment building, which reached a maximum later than one- and two-family dwellings (see Chart 3).

ESTIMATED NUMBER OF DWELLING UNITS BUILT,  
BY GEOGRAPHIC DIVISIONS

Dwelling units built annually in each of the nine geographic divisions were estimated by much the same pro-



cedure as that described above: in the New England, North Central and South Central regions, preliminary totals of the number of non-farm units built each year were estimated in one process by raising the number of units built in the reporting cities of the 257-city series in each division in the proportions indicated for 1920-29. In the Middle Atlantic division separate estimates were made for environs, non-metropolitan cities and rural non-farm areas, based on the corresponding groups of reporting cities, but excluding New York City. In the South Atlantic and Mountain regions also separate estimates were made by class of city in order to give the sample of non-metropolitan cities proper weighting. In the Pacific division estimates for unreported areas were based on the 14 reporting cities, exclusive of Los Angeles which otherwise would have had a disproportionate weighting.

The entire series of estimates was then corrected for the downward bias of the 257 cities, so that the resulting United States totals matched those previously derived. This procedure assumes that the correction for bias is approximately the same for all regions since data are not now available on which to base different corrections for each region, with any degree of accuracy.

#### ESTIMATED NUMBER OF DWELLING UNITS BUILT, BY TYPE OF DWELLING

The number of units of each type of dwelling, i.e., apartments, one- and two-family dwellings, built each year was obtained in the same general manner as the total of all units, by class of city. First, the aggregate number of units of each type built during 1920-29 in each class of city was estimated on the basis of data in the 257 reporting cities, and Census data on dwellings. The two-family dwelling and apartment units built each year were then distributed according to their trends in the 257 reporting cities, since the latter accounted for a large portion of the total building of these types. One-family dwellings were estimated by subtracting the total of two-family and apartment units thus obtained, from the non-farm total of all units built each year as previously estimated.

#### ESTIMATED VALUE OF NEW DWELLING UNITS BUILT

The value of new non-farm dwelling units built was estimated by applying average cost per dwelling unit to the corresponding number of dwelling units built annually since 1920 in each class of city. Because of the limitations of the data, value estimates were not made by type of dwelling or by geographic division.

The average cost per dwelling unit in each class of city was based on the permit data for the corresponding group of reporting cities in the 257 cities, but corrected for undervaluation in building permits, and for non-representativeness of the sample. The derivation of the unit costs for the various classes of cities may be summarized thus:

(1) 120 central cities: the composite average cost per unit for all housekeeping units, including one-, two- and three-or-more family (apartment) dwellings in the 113 central cities, was obtained by subtracting the value of non-housekeeping dwellings from the value of all new residential building as published by the Bureau of Labor Statistics, and dividing by the "number of families provided for" each year. This average was increased 18 per cent as a tentative correction for undervaluation in building permits.

(2) Urban environs: the composite average cost per unit, similar to (1) above was derived for the 64 satellite cities, and increased 24 per cent, of which 18 per cent was correction for undervaluation. The additional correction was to allow for the higher average unit cost in satellite cities of 2,500-25,000 population than in the 64-city sample of cities over 25,000, as shown by 1936 data for 613 reporting satellite cities with a population of 2,500 or more.

(3) Rural environs (see (5) below)

(4) Non-metropolitan urban: since most of the non-metropolitan cities for which building must be estimated are cities of from 2,500 to 25,000 population in which one-family dwellings predominate, the one-family average unit cost is more representative than a composite average including apartments. Therefore, the average cost of one-family dwellings in the 80 reporting non-metropolitan cities was used each year, but reduced 3 per cent as the result of raising the average 18 per cent to correct for undervaluation, and then reducing it to represent all cities of this class properly. The latter correction was based on a comparison of the 1936 average values for the 80 non-metropolitan cities of 25,000 or more population in the 257-city list, and all 956 cities of this class having 2,500 or more population and reporting in 1936. The large volume of low-priced dwellings in the small non-metropolitan cities results in an average for this class only 0.82 of that for the 80-city sample, more than offsetting the correction for undervaluation.

(5) Rural areas: practically no information is available on the year-to-year cost of constructing dwellings either in the rural environs of metropolitan districts or in strictly rural areas. The cities reporting to the Bureau of Labor Statistics include none with a population less than 2,500 and therefore provide no representation in these rural areas, and the F. W. Dodge data on contracts awarded do not lend themselves to a segregation between urban and rural construction. Consequently, the trend of average cost of dwelling units built in rural environs, predominantly one-family, was estimated to follow the trend for one-family dwellings in the reporting satellite cities, but at a level 24 per cent lower. This relatively lower level was determined by a detailed study of estimated average value of all homes in places over 2,500 and places under 2,500 popu-

lation, in environs of metropolitan districts, based on the 1930 Census data on values and rents.

Similarly, unit costs of new dwellings built in the rural non-farm areas were estimated as being 66 per cent of that derived for non-metropolitan urban centers from the relation of estimated values of structures in the rural non-farm areas and of values in the non-metropolitan urban cities based on the 1930 Census data.

The marked differences in the trends and relative levels of unit costs in the various classes of cities are shown in Chart 6. These unit costs multiplied by the number of units built each year (Table 3, B) give the estimated value of new housekeeping dwellings (Table 6, lines 1-9).

Tentative estimates of the value of all residential construction, including hotels, clubs and lodging houses, were made (Table 6) for the sake of comparison with other estimates previously available. No attempt was made to allocate the estimates for non-housekeeping units by geographic division or by class of city. These estimates for non-housekeeping dwellings are subject to correction on receipt of revisions of basic data for the 257 cities in earlier years, to be made by the Bureau of Labor Statistics.

Estimates of expenditures for repairs and alterations of residential buildings were not undertaken for this *Bulletin*.

#### APPENDIX

Unlike previous estimates of the total cost of new residential construction, the estimates in this study are based primarily on building permits in relation to change in number of families rather than on contracts awarded. This course was chosen only after detailed analysis of both series. Some of the limitations of the permit series were discussed in Section II. In attempting to make estimates from the F. W. Dodge Corporation data on residential contract awards three chief difficulties were encountered: (1) Total residential construction and one-family unit cost data were distorted by exclusion of contracts under \$5,000 prior to 1930. This difficulty was made greater by the absence of any means of accurately measuring this omitted construction from the reported data themselves. (2) Data on number of family units constructed are incomplete. (3) Eleven western states are not represented.

The F. W. Dodge Corporation now<sup>28</sup> undertakes to provide virtually complete coverage of new non-farm residential building within the 37 eastern states, except for an undetermined volume of building covered by contracts

<sup>28</sup>Since 1935. The minimum was lowered to \$2,000 in 1930, and again in 1932 was lowered to \$1,000 for both new and alteration work. Beginning in 1935 the minimum for new work was restored to \$2,000, the minimum for repairs remaining at \$1,000.

<sup>29</sup>The \$5,000 minimum was apparently not always strictly adhered to, as the average value of one-family dwellings reported in some southern and western states in earlier years was as low as \$4,700-\$4,800, or below the nominal minimum of \$5,000.

under \$2,000. The exclusion of contracts under \$5,000<sup>29</sup> prior to 1930 caused a greater understatement of the actual volume of building than is generally recognized, and the resulting trend of the contracts reported is not representative for either the 37 states or the country as a whole, as may be demonstrated by the following rough tests: F. W. Dodge Corporation estimates of contracts awarded for residential structures in all 48 states, involving contracts over \$5,000, were 22 billion dollars for 1920-29 (Table 9, col. 3). This total includes cost of hotels. Even if it were all in housekeeping dwellings and the average cost per family unit were \$5,000, it would represent only 4,400,000 units for the decade, which falls considerably short of the ten-year increase of 5,500,000 in the number of occupied non-farm dwelling units reported by the Census of 1930. It is 2,600,000 units less than the probable total of about 7,000,000 units built during the decade, when allowance is made for the 1,500,000 additional units built to offset demolitions, fire and other losses, and for the increase in vacancy between 1920 and 1930. For the total of 22 billion dollars to have accounted for 7,000,000 dwelling units built, the average cost per unit would have had to be as low as \$3,143, a figure much lower than any indicated by actual data on unit costs.

Contracts awarded, which include building in suburbs and rural areas, presumably had much greater coverage than building permits, which are confined to areas within city limits. However, it is significant that the value of residential building permits in 257 cities (Table 9, col. 5) in 1922 and 1923 actually exceeded contracts awarded in 37 states (col. 4) and averaged only slightly less than the estimated total of contracts in 48 states (col. 3).

The data on square feet of residential floor space in contracts also indicate the omission of a considerable volume of building: For 1920-29 the residential floor space in 37 eastern states amounted to 4,143,859,000 square feet.<sup>30</sup> Table 7 indicates that the number of dwelling units built in the 11 western states (Mountain and Pacific regions) is 19 per cent of the number for the 37 eastern states in that period. Thus, if the floor space for 37 states be raised 19 per cent to include the 11 western states a total of approximately 4,931,000,000 square feet is indicated for all 48 states. With an average as low as 1,000 square feet per dwelling unit this would represent only 4,931,000 units. However, it is unlikely that the floor space per unit for all types could have averaged as low as 1,000 square feet, since the bulk of one-family dwellings averaged 1,500 to 2,500 or more square feet, and this type predominates. Apartments might range from 700 to 1,000 square feet, but their volume would be insufficient to reduce the average

<sup>30</sup>Reported in contracts, for 37 states, 1925-29, and estimated by F. W. Dodge Corporation for 1920-24 on the basis of contracts in 27-36 states.

TABLE 9  
 VALUE OF RESIDENTIAL BUILDING, COMPARISON OF ESTIMATES AND REPORTED DATA<sup>1</sup>  
 (millions of dollars)

YEAR	PRESENT ESTIMATE, 48 STATES <sup>2</sup>	CONTRACTS AWARDED		BUILDING PERMITS, 257 CITIES <sup>6</sup>	
		48 STATES	37 STATES <sup>5</sup>		
	FESB ESTIMATE <sup>3</sup>	F. W. DODGE ESTIMATE <sup>4</sup>			
	(1)	(2)	(3)	(4)	(5)
1920	1,122	.....	743	673	.....
1921	1,841	.....	1,146	1,027	937
1922	3,115	.....	1,735	1,555	1,612
1923	3,980	.....	2,073	1,807	2,001
1924	4,244	.....	2,399	2,112	2,070
1925	4,754	3,050	3,076	2,748	2,462
1926	4,314	2,960	2,958	2,671	2,256
1927	4,064	2,856	2,879	2,573	1,906
1928	3,813	3,095	3,069	2,788	1,859
1929	2,623	2,127	2,139	1,916	1,433
1930	1,456	1,222	1,240	1,101	601
1931	1,005	900	901	811	426
1932	282	311	.....	280	103
1933	204	.....	.....	249	91
1934	214	.....	.....	249	76
1935	585	.....	.....	479	212
1936	1,202	.....	.....	802	473

<sup>1</sup>Other than on farms. Includes non-housekeeping dwellings (hotels, clubs, etc.).

<sup>2</sup>New building only.

<sup>3</sup>Source: Federal Employment Stabilization Board, published in *Bulletin 52*, (National Bureau of Economic Research) November 15, 1934, p. 17.

<sup>4</sup>Source: F. W. Dodge Corporation. Excludes new construction and remodeling projects under \$5,000.

<sup>5</sup>Source: F. W. Dodge Corporation. Totals for 1920-22 estimated by F. W. Dodge Corporation on basis of actual contract totals in 27 states; 1923 and 1924 on basis of 36 states. Includes repairs contracts over \$5,000 prior to 1930, over \$2,000 in 1930 and 1931, and over \$1,000 since 1932.

<sup>6</sup>Source: U. S. Bureau of Labor Statistics, *Building Construction*, February 1937, p. 65.

to 1,000. Thus a composite average of 1,200 to 1,500 square feet per unit appears more likely, and if applied to the 4,931,000,000 square feet would represent between 4,100,000 and 3,287,000 units in contrast to the increase of 5,541,000 families, and the total of 7,035,000 units built.

Further evidence of the omission of a considerable volume of one-family and possibly two-family dwellings is disclosed in a comparison of the permit and contract data for these types. In 1925 aggregate value of one- and two-family dwellings for which permits were issued in 257 cities was approximately 1.42 billion dollars. Contracts awarded in 37 eastern states for one- and two-family dwellings in 1925 totaled 1.30 billion dollars,<sup>2</sup> an amount actually less than shown by building permits in the 257 cities. In 1928 contracts for one- and two-family dwellings in the 37 states totaled 1.41 billion dollars. If this high level had been maintained every year throughout 1920-29 it would have represented a total of 14.1 billion dollars; making a liberal allowance of 20 per cent for the 11 western

<sup>2</sup>*Architectural Record*, July 1936, Vol. 80, No. 1, p. 24.

states would raise this hypothetical total to 16.9 billion for all 48 states. At \$5,000 per unit, the Dodge minimum for single contracts, this would have represented 3,390,000 units, or approximately 2 million units less than the 5,360,000 units that the estimates in this *Bulletin* indicate as the ten-year total of one- and two-family dwelling units (Table 2). Or, for the Dodge data to have accounted for the 5,360,000 units, with the aggregate value of 16.9 million, would imply an average cost per unit of only \$3,150, an average clearly too low in view of the large volume of contracts actually reported, averaging \$6,000-\$9,000 and higher for one-family dwellings. The actual level of contracts awarded during the decade of course probably averaged from one-third to one-half less than the 1928 level of 1.4 billion dollars. Thus, it appears that contract data, if available for all 48 states throughout 1920-29, would probably have included considerably fewer than 3,000,000 one- and two-family dwelling units.

If as many one-family dwellings were excluded from the contract data because of the \$5,000 minimum as are in-

licated above, it would go far towards explaining the difference in trend shown by the contract and permit series. For example, the estimates presented in this *Bulletin* indicate that in terms of family units, building of one-family dwellings reached a peak in 1925, while apartment building held at a high level through 1926, 1927 and 1928 (Chart 3). The exclusion of a large number of one-family dwellings from the contract data because of the \$5,000 limit, and possible underreporting in small centers where the one-family type prevails, would tend to overweight the contract series with apartments, which reached highest levels during 1926-28. Inclusion of contracts for all one-family dwellings, with a peak in 1925 would probably have brought the combined total of contracts awarded to a maximum in 1925 instead of 1928, with volume in earlier years much higher than reported.

Acknowledgement is due the F. W. Dodge Corporation for making available to the National Bureau of Economic Research many detailed data on contracts awarded, ordinarily available only to subscribers to the Dodge Statistical Service. While these data were not used as the basis for the present estimates, they furnished valuable collateral material on building trends.

*This BULLETIN presents some of the first results of the major study, Real Estate Financing and Economic Stability, which was initiated at the request of the Social Science Research Council (Committee on Credit and Banking, Division of Industry and Trade) and has been carried on, with its support, by the National Bureau. A second publication, Urban Residential Real Estate, A Handbook of Basic Economic Data on Real Property in American Cities, will be released in the late autumn.*

*Despite the great importance of urban real property in the national economy, no major studies have hitherto been undertaken. As a result, a large part of the three years spent on this project has been devoted to the collection of primary data on urban real property and the organization of scattered data into a form that would make them generally useful. David L. Wickens, under whose direction the study is being made in Washington, has compiled extensive data on values, rents, incomes and financing of real property—the largest volume and the widest range of information yet assembled.*

*By publishing this handbook the National Bureau is able not only to release the basic data earlier than would otherwise be possible but also obviate the necessity for a voluminous statistical appendix to the general discussion of the problems of real estate financing that will be published at a later stage in the inquiry. The volume will contain about 200 tables, a brief description of each principal table, and possibly some charts. It will provide individuals, Govern-*

*ment agencies, banks and other institutions with useful material for studying numerous phases of the urban residential property situation.*

*Mr. Wickens is the expert on farm mortgages for the Department of Agriculture and the final report will cover farm as well as urban real estate. He participated in the inventory of real property and directed the financial survey of urban housing made by the United States Department of Commerce.*

*In view of the great expense of reproducing the basic tables, the National Bureau would like to have advance orders as a means of determining the size of the edition. The price of the book will depend somewhat upon the number printed but it will probably not exceed \$5.00.*

FROM REVIEWS OF RECENT NATIONAL BUREAU BOOKS

*Ebb and Flow in Trade Unionism*, by Leo Wolman  
(251 pp., \$2.50)

"There are two ways of writing labor history. One may put oneself in the very position of the leaders of the movement performing the continuous experimenting with the general community and with labor itself, of which labor history is the written record. By this method of approach the reader is taken over a succession of concrete situations, resembling so many campaigns, and his attention is centered on the actual process of 'trial and error,' the decisions made, the obstacles encountered, the catastrophes and victories, and the institutions shaped. The generalizations which emerge deal with the characteristics of the American social habitat, the basic group psychologies on either side of the line, and the types of 'industrial government.' The second method of approach is that of a 'historical atlas of unionism.' Here the dominant interest is not the particular situation, the strategy employed, or the shape of the ultimate institutional structure, but all of these are reduced to a two-dimensional expression.

"The author's method is obviously the second one. Yet as an American labor student second to none in this generation for his intimate contact with industrial labor problems, both as an adviser of leaders and as an 'activist' on his own accord, Professor Wolman has made his 'quantitative' treatment simultaneously a most outstanding success as labor history writing of the first-mentioned variety. It is as if in watching the expansion and contraction of the red-tinted area on the geographical globe one could be made aware at the same time of the advances and retreats of the red-coated armies of Britain." Professor Selig Perlman, University of Wisconsin, in the *Journal of the American Statistical Association*, March 1937, Vol. 32, No. 197.

"This able and cautious book about trade unions in the United States appears at a suitable moment in the history

of the subject. The American labour movement is in the midst of an upheaval. The drive for industrial unionism on the lines now being laid by Mr. John L. Lewis, of the United Mineworkers of America, the most densely organised industrial union in the country, may well lead either to a fundamental change in American labour history, or it may pitchfork the United States into a spell of reaction. Mr. Wolman's careful study of the history of American trade unions from the end of the War down to the middle of last summer provides us with a stable background of facts and figures against which current speculations may be judged. Among the special characteristics of American trade unionism described by Mr. Wolman are the very small percentage of American workers who are in any way organised, the essentially 'craft' nature of most unions, the competitive factors of 'welfare capitalism' and undercutting in unorganised areas in so vast a country, the absence of a 'class psychology' basis for the labour movement as a whole, the strong anti-unionism of employers and the very important part played by political and governmental factors during the last three years. These matters are examined with the aid of a wealth of valuable statistics and an appendix containing information about the leading unions and about trade unions in other countries. We are left with a feeling that American trade unionism has an immense way to go, but that its very insignificance leaves room for great elasticity of movement in the future."

*New Statesman and Nation*, May 22, 1937

*Prices in Recession and Recovery*, by F. C. Mills  
(561 pp., \$4.00)

"Prices and price relationships almost completely dominate the economic life of the nation. Fundamental to human welfare as are the activities of production, distribution and consumption of goods, it is prices as a medium of control which, in their ceaseless changes and readjustment, stimulate or retard the processes by which our industrial and commercial life are carried on, and govern the direction of human effort.

In 1927 Dr. Mills made an important contribution toward an understanding of the nature and function of prices in *Behavior of Prices*. In 1932 he made a further contribution in *Recent Economic Tendencies*. In the present volume Dr. Mills has rounded out this study of prices by carrying it through the recent period of recession and revival.

These three works, covering the relationship and movement of prices since the beginning of the century, represent an objective exploration into the realm of prices and their nature and influence by an economist aloof from the pressure and the prejudices of business or politics. They comprise a record that doubtless will serve as source material for generations.

The present volume is of particular significance as an

authentic record of price movements during a serious depression and the following revival. It is an excellent picture of the price mechanism as it has been affected by, and in turn has affected, the pattern of economic life during this period." *The Annalist*, December 25, 1936.

"Professor Mill's study of price-movements since 1929 must be one of the most minute ever made of any period, and is likely to prove a mine which will be gratefully worked by several generations of students to come. . . . He treats the question of decline and recovery comparatively for thirty-two countries. The inference is that the action taken, particularly in the monetary field, by their Governments accounts for the dissimilar course of events in these countries, since if that factor were not important one would expect to find countries of the same economic type experiencing the same price-movement (not necessarily simultaneously) in a given world situation. But, although Professor Mills observes that 'the international pattern is not a simple one,' he has little to say about purely monetary influences on the price structure. Rather he directs our attention to changes in the price-margins between different stages of production; to the changing position of primary producers; to the position of capital goods industries; and to changes in the prices of consumers' goods due, e.g., to the increased importance of salesmanship and advertising. British readers will perhaps be struck as much by his silence about the 'inflexibility' of wages as by his disregard of currency and credit policy. Indeed, part of the value of Professor Mills' study lies in its insistence on factors which have bulked large in the American situation, since it stimulates us to re-examine our ideas about the depression in this country. In particular, he brings out a point to which comparatively little attention has been paid by English economists—the fact that after the war the tendency was for the gap between the prices of finished products and those of raw materials of manufacture to widen, reversing the trend noticeable for a quarter of a century before. We are familiar with the compensatory cheapening of imports which helped us to last out the years of shrinking trade and growing unemployment with no great social distress; but we have not yet taken adequately into account the implications of the current trend. If it persists, the areas of primary production can no longer expect even to retain their former share of the world's real income; and the capital sunk in them when their prospects were better will have largely to be written off.

"To follow out such possibilities would, however, take us a long way beyond the scope of Professor Mill's book. He has confined himself to an elucidation of the facts of recent price-history. The result is a model of statistical research of which the publishing bodies may justly be proud." *Economist*, April 24, 1937.