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# Evaluation of Total Series

Despite their patchwork makeup by a combination of separately fashioned decade totals, the ten resulting sets of annual estimates of residential building fit together with little need for smoothing. Only one decade ending, that of 1929, was altered to smooth the connection. The resulting series is set forth in Table 15 and shown in Chart 21, together with the Long, Riggleman (Isard adjusted), and the Blank series.

All the major movements which run through these indexes, including short cyclical play, are reflected in ours. The new index is believed to catch more accurately the true secular drift and the relative play of long swings. The following tabulation of average long-swing amplitude and secular growth rate shows that the new index, compared with other measures, has low amplitude but relatively high secular growth. Five features of the new series call for detailed comment.

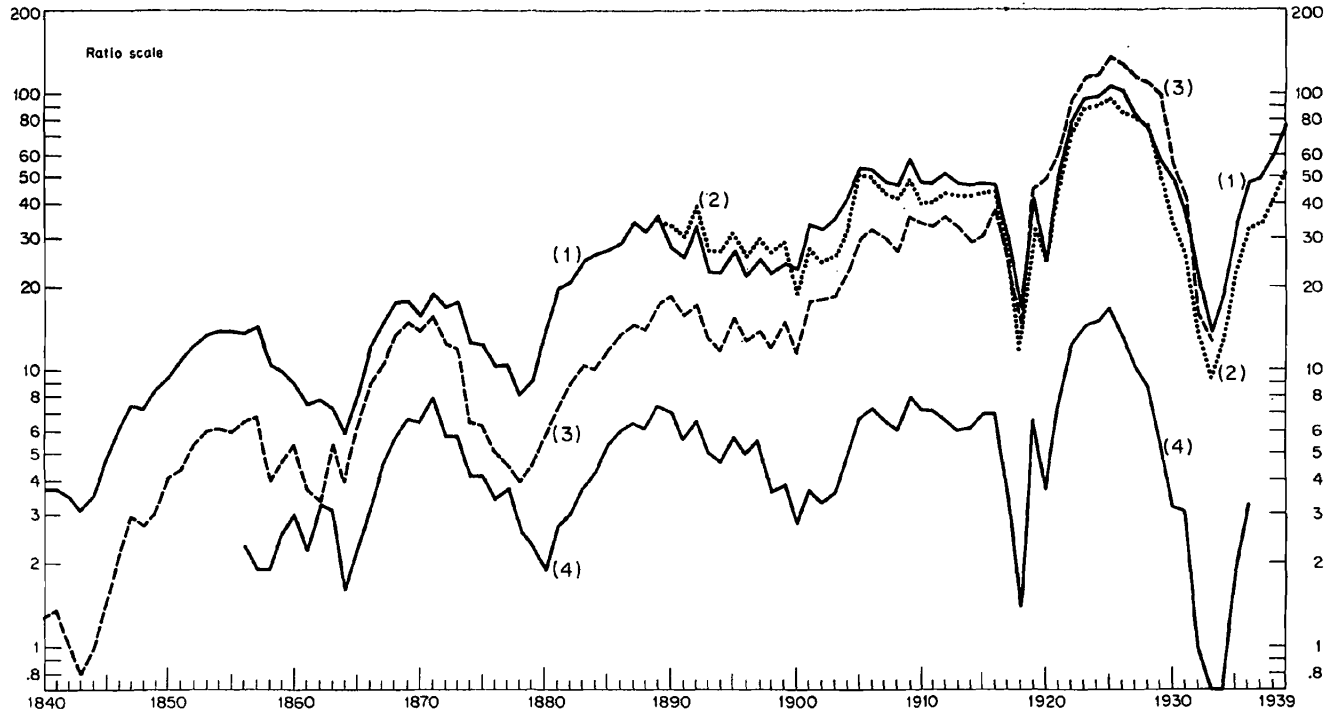
| *Series* | *Years Covered* | *Number of Long Cycles* | *Total Average Specific Amplitude* | *Long-term Rate of Growth* (per cent per annum) |
|---|---|---|---|---|
| Riggleman-Isard index building permits | 1862-1933 | 4 | 230.0 | 4.03 |
| Gottlieb | 1862-1939 | 4 | 200.4 | 2.74 |
| Long index number residential permits | 1856-1936 | 4 | 278.6 | 1.59[a] |
| Blank new dwelling units started | 1889-1959 | 4 | 249.1 | 1.90 |

[a] Growth rate for Long's index of the total number of permits. (M. Abramovitz, *"Evidences of Long Swings in Aggregate Construction Since the Civil War,"* a National Bureau study, in preparation, Tables 7, 16).

First, the series shows a double peak between 1868 and 1871 with a sizable fall between, regarded here as corresponding with the nature of the post-Civil War expansion. The expansion in Ohio, where its course may be clearly traced, ebbed and flowed in course. As Table 16 and

## CHART 21

### Estimates of United States Residential Building, 1840-1939




Evaluation of Total Series

**Source**

1. New series (10,000 units), *Source* Table 15.
2. Blank series (100,000 units), Blank, *Volume of Residential Construction.*
3. Riggleman-Isard Index (1920-29 = 10,000), relatives in hundredths, source, Colean and Newcomb, *Stabilizing Construction*, p. 227.
4. Long (1920-30 = 100), relatives in tenths, source, *Historical Statistics*, 1949, p.173.

Chart 22 show, the 1868-69 peak was sizable and the resulting ebb was almost as serious as the decline after 1873-74. Ohio marriages show a peak in 1866, while the national marriage rate was higher in 1867 than in later years.[69] Both data indicate an ebbing in household formation between 1867 and 1871. If our decade patterns are right, then the early post-Civil War peak rivalled that of the early seventies.

Second, the housing decline of the seventies and boom of the eighties are moderate in amplitude. The relative conformation of housing production in the two decades is no quirk of a statistical mosaic but reflects the tendency for realized amplitudes to dampen as a wider range of urban-size classes and regions is covered by the aggregate.

Third, the new index shows a substantial decline in the nineties relative to the boom of the 1880's and 1900's, a pattern of movement shared by both the Riggleman (Isard) and Long series.

Fourth, in our series the sharp drop of 1900, which characterizes all permit-derived series (Riggleman, Long, Newman, Blank), is greatly reduced. Since the sharp drop sets a long-swing trough it merits detailed enquiry. The relative behavior of the various permit-derived series is set forth in a note below.[70] The mild drop in the Chicago building permit

[69] Ohio and national marriage data are as follows:

| *Year* | *Ohio* Number of Marriages[a] | *Nation* Marriages per 1,000 |
|---|---|---|
| 1858 | 21,352 | |
| 1863 | 19,187 | |
| 1865 | 22,404 | |
| 1866 | 30,579 | |
| 1867 | 29,230 | 9.6 |
| 1868 | 27,798 | 9.0 |
| 1869 | 25,625 | 8.9 |
| 1870 | 25,459 | 8.8 |
| 1871 | 24,849 | 8.8 |
| 1872 | 26,616 | 9.0 |
| 1873 | 26,692 | 9.0 |

SOURCE: Ohio Statistics, NBER files; *Historical Statistics,* 1949, p. 44, Series C77.

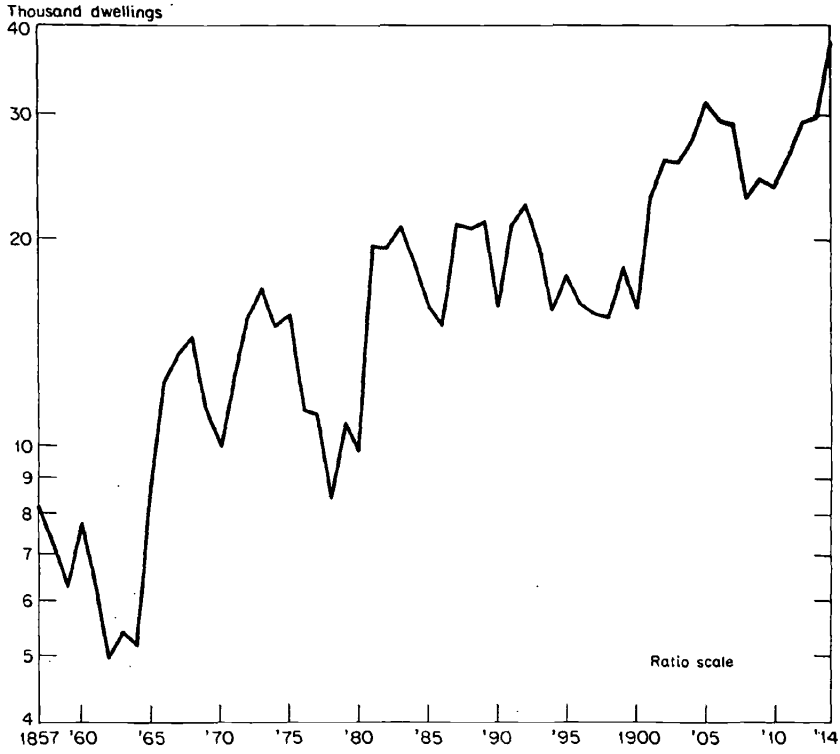
[a] Year ending June 30.

[70] Some of the permit-derived series for 1899-1901 follow:

| | *1899* | *1900* | *1901* |
|---|---|---|---|
| Riggleman, per capita permits ($) | 31.37 | 21.71 | 30.59 |
| Chicago, building permits value ($ mill.) | 20.9 | 19.1 | 34.9 |
| Long, index, residence permits (1920-30=100) | 38 | 28 | 36 |
| Blank, number dwelling units (000's) | 282 | 189 | 275 |

**CHART 22**

**Number of New Dwellings, Ohio, 1857-1914**




Source: NBER files of Ohio building data.

| | *1899* | *1900* | *1901* |
|---|---|---|---|
| Newman, building index (1913=100) | 70 | 46 | 66 |
| Number of dwelling units | | | |
| Boston | 3,700 | 2,378 | 2,569 |
| Brooklyn | 9,966 | 5,939 | 7,012 |
| Manhattan | 29,447 | 8,996 | 19,745 |
| Detroit | 1,278 | 1,323 | 1,620 |
| San Antonio | 222 | 323 | 629 |
| St. Louis | 1,390 | 1,287 | 1,850 |

SOURCE: M. Colean, *American Housing,* NY, 20th Century Fund, 1949, p. 408; GBW, p. 332; Riggleman, *Variations in Building,* pp. 260-1; Long, *Building Cycles,* App. B., p. 228; Newman, *Building Industry,* p. 63, Table IX, col. 4.

series is inexplicable in view of the famous strike which paralyzed building in that city during most of 1900.[71] The report of building in Ohio shows a mild drop, while the nationwide production of building materials and the behavior of building prices testify, not to a drop in 1900, but to a rise.[72] Many cross-checking measures of building trade unemployment fail to indicate deterioration in 1900.[73] General building trade reports indicate

[71] Though Hoyt omits mention of the strike, it was well publicized in the building trade and made national news. A general contractor lockout in the building trades, instituted Feb. 5, 1900, paralyzed Chicago building until May 1901 (R. B. Montgomery, *Industrial Relations in the Chicago Building Trades,* Chicago, University of Chicago Press, 1927, pp. 28 ff.). For current notice see the building trade journal, *Carpentry and Building,* Jan. (editorial), Aug., Sept., and Nov. 1900. See also detailed hearings before the Industrial Commission (*Report of the Industrial Commission on the Chicago Labor Dispute of 1900,* Commission Report, Vol. 8, 1900).

[72] See the following record of behavior (values in dollars):

| | *Ohio, Value Total Building* | *Ohio, Number Dwellings* | *Shaw Deflated Construction Material* | *Building Material Prices* (BLS index) |
|---|---|---|---|---|
| 1898 | 24,327 | 15,237 | 1,341,569 | 39.6 |
| 1899 | 29,412 | 18,237 | 1,246,964 | 43.6 |
| 1900 | 29,748 | 15,967 | 1,425,045 | 46.2 |
| 1901 | 41,102 | 22,796 | 1,618,673 | 44,3 |

Source: NBER file 0147; unpublished adjusted building value; *Historical Statistics,* 1949, Series H50, p. 171, Series L22, p. 234. The 1900 Census editors' report on clay products manufacture noted that the census report for the year ending May 31, 1900, showed that the building trades were not yet "fully recovered from the panic of 1893" (1900 *Census of Manufactures,* p. 904). A special census report comparing manufacturing activity in the census year with the preceding year (1898-99) showed that brick and tile output in the census year was 16 per cent above that in 1898-99 (*ibid.,* p. lxi).

[73] See Paul Douglas, *Real Wages in the United States, 1890-1926,* Boston, Houghton Mifflin, 1930, pp. 135-6.

| | *Union Wage Rates, Building Trades* (cents) | *Average Workweek* (hours) |
|---|---|---|
| 1898 | 34.8 | 49.5 |
| 1899 | 36.1 | 48.9 |
| 1900 | 37.4 | 48.3 |
| 1901 | 39.1 | 47.5 |

In New York and Massachusetts, unemployment rates for 1900 showed a moderate percentage rise (though the peak was 1897): 1897, 32; 1898, 28.3; 1899, 20.9; 1900, 26.7; 1901, 17.8 (Douglas and A. Director, *The Problem of Unemployment,* New York, Macmillan, 1931). More conclusive on building trade unemployment in 1900 is a census count of unemployment for the year ending May 31, 1900. It showed, when compared with a similar count in 1890, higher percentage rates of unemployment during the same portion of the census year:

marked slacks in Boston, Manhattan, and Chicago and a varied picture elsewhere, but no state of general decline.[74] Real estate indexes of market

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| | *1899-1900* | *1889-90* |
|---|---|---|
| Carpenters and joiners | 41.4 | 31.8 |
| Masons | 55.5 | 42.9 |
| Painters, etc. | 42.4 | 31.1 |

As the census editor noted, the results are not comparable because of loose framing of the census questionnaire and failure to make allowance for normal seasonal unemployment or work interruptions due to weather, etc. Even in the more prosperous year that followed, 1901, a survey of annual earnings showed the wide distribution of full days worked by building trade workers (assuming a wage of 37.5 cents per hour, a fifty-hour week, and the average layoffs):

| *Average Estimate, Number Days Worked* | *Per Cent Full Days Worked* | |
|---|---|---|
| | 230 Bricklayers | 1,095 Carpenters |
| 27 | 0.4 | 0.5 |
| 40 | 0.4 | 0.9 |
| 67 | 1.3 | 2.5 |
| 93 | 7.4 | 6.3 |
| 120 | 8.3 | 12.1 |
| 147 | 8.7 | 18.2 |
| 173 | 19.1 | 23.5 |
| 200 | 25.6 | 22.4 |
| 227 | 20.9 | 7.1 |
| 253 | 11.7 | 4.7 |
| 293 | | 1.9 |

(see *Cost of Living and Retail Prices of Food,* Department of Labor, p. 280 ff.). Reworking the 1889 and 1899 census results to allow for "normal" building trade unemployment, Douglas and Director (p. 30) found the percentages of unemployment were 8.8 per cent in 1889-90 and 12.8 per cent in 1899-1900, about what would be expected without a sharp drop in residential building in 1900.

[74] A "great and . . . general" falling off of building work was reported for New York City (*Carpentry and Building,* July 1900, p. 195), but it was ascribed to resistance to sharp 25 per cent increases in building material prices—characteristic of cyclical peaks. The monthly reports, "What Builders are Doing," for 1899 and 1900, reflect an uneven but not a dull picture for 1900.

Baltimore, "quiet though about normal," Aug.; Boston, off '99 by 30 per cent, July, but suburbs strong, Nov.; Cleveland, off '99 by 7 per cent; Columbus, Ohio, "very encouraging," up 25 per cent over '99, Nov.; Denver, "gratifying increase" over last year, Nov.; General Report, "it is well known that building operations have been on a comparatively small scale all over the country," Nov.; Hartford, Conn., "building quite active just at present," Nov.; Kansas City, Mo., "considerable amount of work in progress, . . . greater than at any time during the past ten years," Nov.; Los Angeles, "year expected to far exceed 1899," Aug.; Manhattan, off '99, 25 per cent, July; Memphis, Tenn., 27 per cent over 1899, Nov.; Milwaukee, off '99 by 35 per cent, July; New Haven, Conn., "showing more activity in building operations," July; New Orleans, "greater than ever before," Nov. and Dec.; Omaha, busier in July than in "a series of years," July; Pittsburgh, "new record," 33 per cent over '99, July; Portland, Maine, "building

activity are positive or show only slight declines.[75] Retrospective surveys of general business conditions record in 1900 only a mild recession with no indication of a sizable fall in building.[76] From all this we conclude that the building permit indexes, with their overweighting of central city behavior, limited coverage, and inherent biases, erred badly in the 1900 count.

Fifth, in our series the pattern of movement around the ten-year period centering in 1900 (but exclusive of 1900 itself) shows a substantial rise in residential building in 1901-04 as compared with the rise in 1896-99. The ratios of total residential production in the later period to that in the earlier period, for our series and for related measures, are shown in the tabulation on the next page.

Thus, though our annual indexes were drawn entirely from BLS-NBER for the 1890's and substantially from that source for the 1900's,

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operations are decidedly active," Nov.; Portland, Ore., "a large increase" over same months of previous years, Nov.; St. Louis, "very quiet," July; San Francisco, "good shape," "greater than for several years," little idleness, July and Nov.; Seattle, Wash., "now the most active building center of the Pacific Coast," Nov.; Tacoma, Wash., more than double 1899; Washington, Pa., "looking for something of a boom this fall," July; Worcester, Mass., "fair amount of building in progress," Nov.

[75] Thus, see the following:

| | *1899* | *1900* | *1901* |
|---|---|---|---|
| (1) Number mortgage recordings, 9 counties | 49,333 | 46,271 | 46,161 |
| (2) Ohio, total mortgages (for year ending June 30) | 78,191 | 79,026 | 81,861 |
| (3) Ohio total deeds (for year ending June 30) | 111,879 | 111,877 | 124,585 |
| (4) National index, real estate activity | 669 | 754 | 874 |

SOURCE: (1) E. Fisher, *Urban Real Estate Markets,* New York, NBER, 1951, Table A-4; (2) NBER files 0168, Gottlieb, Long Swings study; (3) NBER files 0157, Gottlieb; (4) NBER tabulations, Abramovitz, Long Swings study, series 000661.

[76] See W. H. Person's annual survey, "The Records of Business Since 1875," with his display of the monthly values of eleven basic series (*Forecasting Business Cycles,* New York, Wiley, 1931, p. 123). W. C. Mitchell noted some signs of cyclical slippage—stock exchange sales down, outside clearings off a bit, and industrial consolidations reduced, but "the volume of general business still remained immense" (*Business Cycles,* University of California Press, 1913, p. 64). Note also the low amplitude (3.7) of the 1899-1900 contraction in the fifteen surveyed contractions between 1879-1929 (A. F. Burns and W. C. Mitchell, *Measuring Business Cycles,* New York, NBER, 1946, Table 156, p. 403).

| *Series* | *Residential Production or Building in 1901-04 Relative to 1896-99* |
|---|---|
| Gottlieb | 151.1 |
| Blank (BLS-NBER) | 99.2 |
| Long | 93.7 |
| Ohio (statewide) | 156.2 |
| Riggleman-Isard | 143.1 |

SOURCE: Table 15; NBER series 0147; Colean and Newcomb, *Stabilizing Construction,* p. 231, App. N., Table 2; *Nonfarm Housing Starts,* p. 15.

our derived pattern movement around the decade turning point differs widely from the BLS-NBER one. The difference is largely due to the decision made earlier to step up the rate of decade growth for the 1900's implicit in the BLS-NBER (and the Long) series, and to step down the BLS-NBER decade total for the 1890's. The new pattern of movement around the junction of the two decades follows the pattern of the Ohio and Riggleman-Isard series but diverges sharply from both the Long and BLS-NBER series. No claim can be made that the annual distribution of the altered decade levels is, in any real sense of the word, accurate. The new annual distribution is, however, more consistent with all our information about decade levels, growth trends, and annual patterns of change.

The residential building series developed by the present study can not be accepted as a final solution. The weaknesses of the series and the many improvisations and sheer guesses which entered into their making are self-evident. The calculations were carried through only to test the validity and fruitfulness of the research methods proposed and to sketch out the best possible version of United States nonfarm residential building, given our present knowledge, the limits of this study, and the many attempts at measurement on record.

The next step would be to refine the analysis and test its materials. The following steps—listed not necessarily in the order of their importance —would be important extensions of this work. Critical evaluation of the results reported here will yield additional ones.

1. Since the Ohio building statistics are an important asset in reconstructing the history of residential building in the United States, additional evaluation of them seems desirable. Tests of formal validity, such as checking for internal consistency and plausibility and comparison with independent data, have already been made. It would be helpful to establish by field visits and historical research the character of local records maintained by collecting agents, the responsibility of local data col-

lectors, contemporary evaluation of the statistics, and procedures used in administering the statistical reporting system.[77]

2. The Ohio building statistics were compiled for five sample groups of counties which differ in degree of urbanization, size of central cities, and response to economic influences. Tabulation of the Ohio returns—laid out as county totals for some 88 Ohio counties—by still other groupings would permit a more refined system of multipliers by which to develop more accurate residential building estimates. We might also consider grouping Ohio counties into sets, by degree of urbanization and other characteristics to be gleaned from census reports, and then try to project the experience of Ohio county groups to the universe of comparable counties located elsewhere.

3. Apart from the limits imposed by time and money, there is no justification for projecting from Ohio directly to the national aggregate. At the very least, the southern region of the country should be treated separately, because its demography, urbanization, and rates of change preclude its addition to a national projection without allowance for its special characteristics. Complicated southern farm and dwelling statistics need special handling. The census reports of growth of farm enterprises in the South—and hence in the national totals—reflect in part the breakup of the large plantation and the rise of the sharecropper system. Negro housing with its drastically lower level of quality should probably be reported separately from white units or should be stated in terms of "white equivalents."

4. Loss and shrinkage ratios could profitably be studied more thoroughly. The Ohio loss ratios may not be characteristic of eastern seaboard dwelling structures with their greater degree of brick or masonry construction compared with central state dwellings of the period. It is likely that the insurance literature of the nineteenth century with information from other sources would tell the story of losses by fire and disaster. Various government geological agencies collected and published information on the prevalence of stone and brick construction which could be used in developing fire loss ratios. Additional information on estimation of acceptable or plausible loss ratios is badly needed in setting the general level of estimates of housing production.

5. The 1840-60 projection could probably be improved by use of

[77] An effort was made to explore the archives of the state statistical bureau, but all trace of its records had disappeared; county records are, however, available for searching.

property-assessment increments available for many states and cities. Real property assessments will reflect, however unevenly, movements of building; and annual tax returns have been compiled in public documents of most states.

6. The work reported in this paper has been carried forward in a parellel study, to be published elsewhere, developing annual estimates from 1850 to 1939 of dollar expenditure upon nonfarm building, both residential and nonresidential.[78] The estimates presented in this study were utilized, together with an independent set of estimates of average per-unit dwelling value in constant dollars, to determine estimates of gross residential new construction. From 1850 to 1912 the per-unit values were derived from the Ohio sources adjusted to exclude farm-dwelling values and to reflect nationwide value levels. The residential values were then projected against a parallel set of values for total nonfarm building. The total values were derived by projection against census bench marks of Ohio building rates to obtain nationwide decade aggregates, which were allocated into yearly returns by use of a set of distributing indexes. For the period 1850 to 1914 the values for nonresidential building were determined residually. The 1915 residual nonresidential values were linked to our established nonresidential building series which had been integrated by the Departments of Commerce and Labor with a detailed network of construction statistics. The fact that linkage could be effected without stretching estimates or adjustments out of shape testifies, it is hoped, to the soundness of the research methods and to the validity of the basic data used here.

[78] See my study, "Value of Nonfarm Building," referred to above, n. 62, and available in mimeograph, on request.