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Chronology of Long Swings in the Level of Construction Activity

The problem in this paper, as indicated, is to throw light on the existence of long swings in aggregate construction activity since the Civil War. Evidence of such swings is sought in the behavior of measures of total construction and in the degree to which long waves in total construction are shared by measures of activity in the major sectors.

Our general conception of a long swing is of a persistent tendency to form waves with a period longer than that of ordinary business cycles. In the context of United States experience, this means a period longer than four years.[1]

Having regard to the long-term upward trend in construction, such a tendency might manifest itself strongly, i.e., the observed fluctuations might involve alternations between periods when the absolute level of construction was rising and periods when it was falling; or the tendency might be relatively weak and reveal itself only in fluctuations in the rate of growth of construction. The basic idea, therefore, concerns the duration of the waves, and the basic question is whether there is evidence

[1]The average duration of business cycles since 1854, calculated from the National Bureau's monthly reference chronology, follows. The cycles occurring during the Civil War, World War I, World War II, and the Korean War were omitted from the peacetime averages.

	Trough-to-Trough Cycles					*Peak-to-Peak Cycles*			
	All Cycles		Peacetime Cycles			All Cycles		Peacetime Cycles	
Period	No.	Duration (months)	No.	Duration (months)	Period	No.	Duration (months)	No.	Duration (months)
1854-1961	26	49	22	45	1857-1960	25	49	21	46
1919-1961	10	50	8	45	1920-1960	9	54	7	48
1945-1961	4	46	3	42	1948-1960	3	46	2	41

Source: *Business Cycle Developments*, Bureau of the Census, December 1961, Table A, p. 57.

of a tendency for aggregate construction to move in waves longer than ordinary business cycles.

The method of this paper is first to try to identify such long-swing movements by inspecting charts of time series, subject to certain rules designed to make this initial identification relatively objective.

The task of identifying long swings in construction and of developing a chronology of the peaks and troughs of these movements is complicated by the fact that construction activity fluctuates with considerable regularity in a relatively short movement associated wih business cycles.[2] The danger is, therefore, that the two types of movements may be confused. We have tried to reduce this danger by following a special procedure. We first smoothed each series by computing its average level in successive business-cycle periods, measured both from trough to trough and from peak to peak. The peaks and troughs in question are those established by the National Bureau in its annual business-cycle chronology. Thus, the averages refer to the same periods in all series.[3] The resulting figures are series of smoothed data consisting of average annual values for overlapping business-cycle periods. They may be regarded as approximations to series from which the influence of business cycles of ordinary duration and amplitude has been eliminated. Since business-cycle periods have been close to four years in duration on the average, and since averages are computed for overlapping business-cycle periods, observations on the values of such "business-cycle-

[2]Cf. Long, *Building Cycles and the Theory of Investment* (33), Chapter V; Burns and Mitchell, *Measuring Business Cycles* (8), Chapter 11; and Guttentag, "The Short Cycle in Residential Construction" (23), pp. 275-298.

[3]It might have been better for some purposes to have struck averages for periods bounded by the peaks and troughs of cycles in each particular series whose duration corresponds roughly to that of business cycles ("specific cycles" in the National Bureau terminology), but this was not practicable. Since the original data are annual, they themselves accomplish a certain attenuation of short business-cycle movements. As a result, some specific cycles which would appear in monthly data are not clearly apparent in annual series, or they appear only as a fluctuation in the rate of change. In some series, or in certain periods, the interval between successive peaks or troughs might be several times as long as ordinary business cycles. Averages struck over such long periods would tend to eliminate some or much of the long swings we seek to observe. The same conditions would also mean that values of the smoothed data would only be available at very long intervals, and the observations would cover different periods for each series, making comparisons difficult. For these reasons, it seemed safer and better to compute averages for periods bounded by the peaks and troughs of business at large rather than for periods bounded by the turning points of individual construction series.

corrected" data are available at approximately two-year intervals, although the actual intervals vary with the duration of successive business cycles.

With the smoothed data in hand, we next inspected charts of both the original annual data and the smoothed data of each series for evidence of long swings. Charts 1 to 3 are examples reproduced to a smaller scale. Readers will find the charts helpful in gaining definite ideas about the character of fluctuations in total construction and its major sectors and about the kind of choices that were made in identifying long swings in the level of construction activity. Movements in the annual data were accepted as phases of long swings if they suggested a trend-like movement lasting distinctly longer than an ordinary business-cycle phase, but only if this impression was confirmed by a like movement in the smoothed data. In this way, we tried to guard to some degree against the danger of identifying business-cycle movements as long swings. On the other hand, a movement in the smoothed data was regarded as evidence of a long swing, and so as confirmation of a tentative observation in the annual data, only if the movement in the smoothed data was not apparently due to a sharp random movement in the annual data. One practical consequence of these two rules is that, with certain exceptions, each long swing recognized in the annual data has its counterpart in the smoothed data, although the dates that mark the turning points of long swings in the smoothed data are not exactly the same as those in the annual data. The only class of exceptions large enough to need general notice occurs at the beginning or end of series. Here it sometimes happens that a clear long-swing turning point can be identified in the annual data; but, because the series does not extend backward or forward for enough years, it is not possible to identify the corresponding turn in the smoothed data, that is, in the average standings of the series during reference (business) cycles. Thus, long-swing troughs have been marked in the annual data of a number of series in the early 1930's, although the data do not extend far enough to reveal the corresponding trough in the smoothed data. Similarly, long-swing peaks have been marked in the early 1870's in some series, although the data do not go back far enough to permit the computation of the corresponding peak in the average reference-cycle standings.

Subject to these restrictions, all movements were accepted as long

CHART 1
Aggregate construction: Annual Data and Average Reference-Cycle Standings, 1856-1959

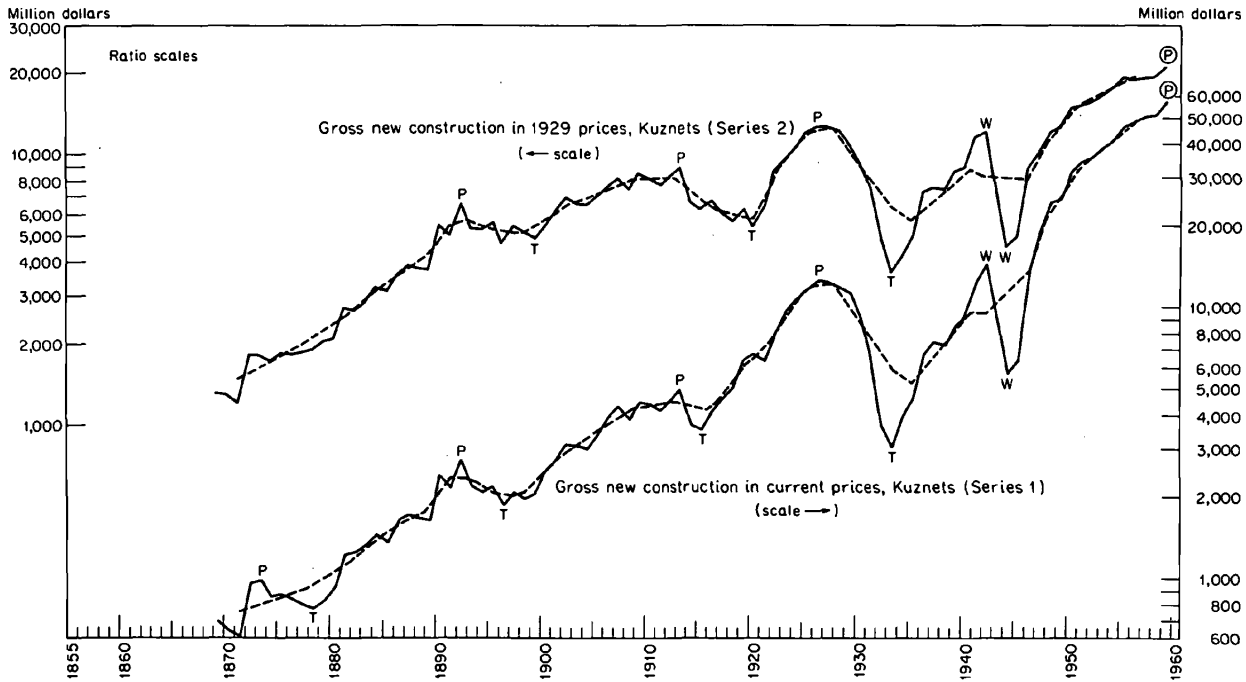


CHART 1 (concluded)

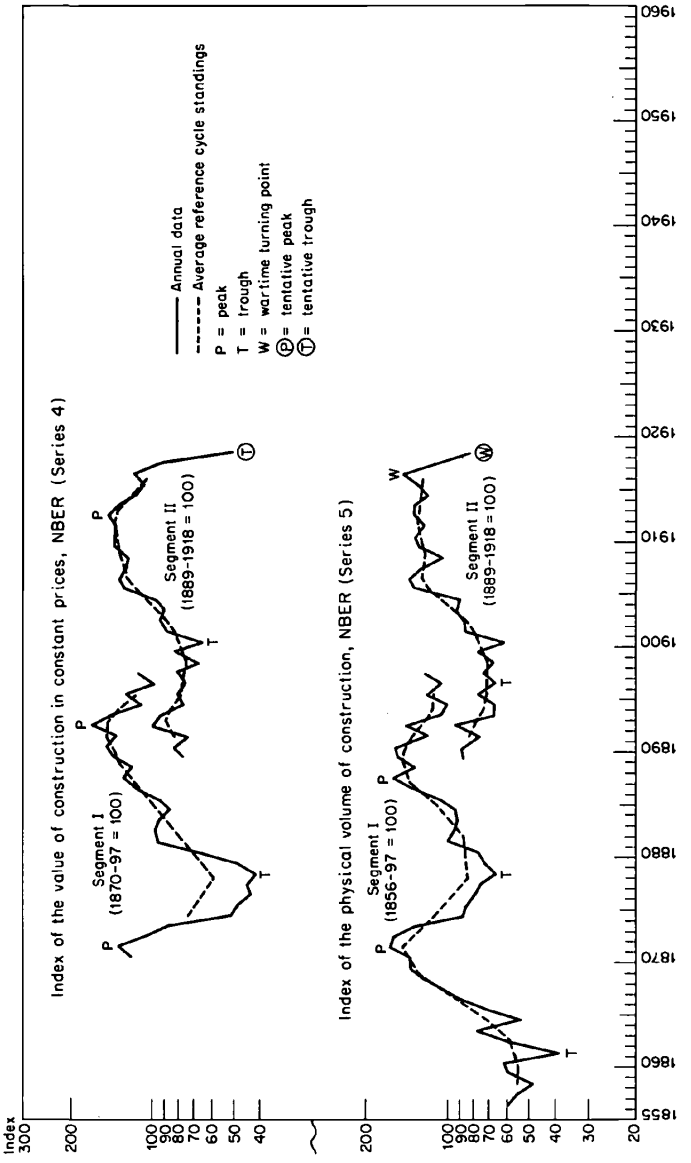
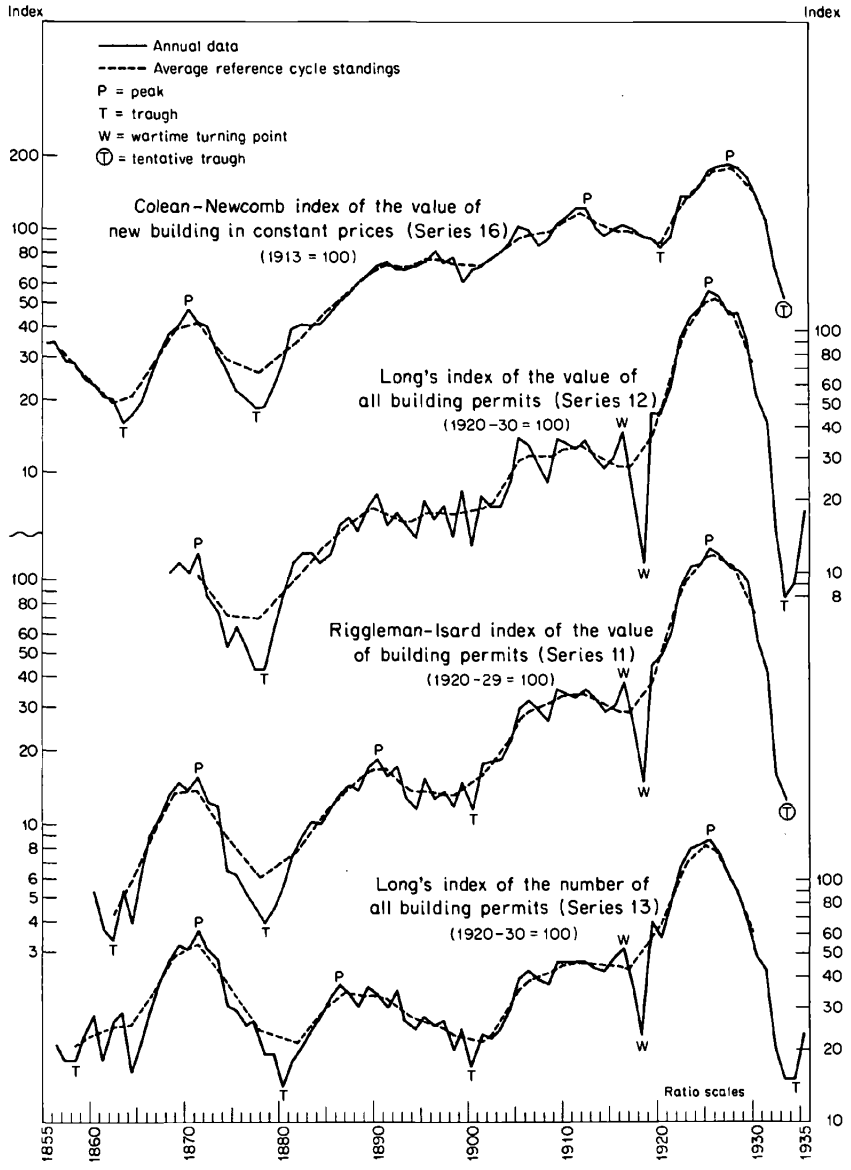


CHART 2
Total Urban Building: Annual Data and Average Reference-Cycle Standings, 1855-1935



swings provided they formed waves with a duration of at least five years, measured both from trough to trough and from peak to peak, and provided they were not interrupted by similar waves with amplitudes approaching their own. The amplitude criterion is manifestly fuzzy. There were, however, very few worrisome cases; the amplitude characteristics of the movements accepted as long swings are described in Chapter 5 and documented in Tables 7 to 9. The duration criterion, which we set only slightly higher than the average duration of business cycles, may appear to be unduly low, since our interest is in swings which are significantly longer. It has been deliberately placed low in order not to prejudge the duration of the long swings: although the *average* duration of long swings may turn out to be distinctly longer than the average duration of business cycles, the range of durations of movements which belong in the class of long swings may be considerable and may include members which were cut short by accidental disturbances. This practice of setting a low minimum duration as a working basis for recognizing long swings corresponds to the National Bureau practice of setting a high maximum limit as a working basis for recognizing specific cycles. Although business cycles in the United States have been only some four years long on the average, the Bureau identifies as specific cycles sequences of expansion, recession, contraction, and revival lasting as long as ten or twelve years.[4]

A special problem arose in connection with the two world wars. In each war period, many types of construction activity slumped sharply for one, two, or sometimes three years. Smoothed data often give the appearance of a long-swing decline, but these are patently only the reflection of wartime conditions. Our general rule calls for neglect of these movements. The war-induced declines, however, were so severe that they must have influenced the history of the subsequent long upswings. For example, it would be seriously misleading to regard the movement in Long's index of the number of urban building permits (Chart 2) from its trough in 1900 to its peak in 1925 as an uninterrupted long upswing. In such cases, "wartime" peaks and troughs have been marked off in the annual data to indicate a major break in the movement of series. Indeed, wartime turns have usually been marked in the annual data where the war brought a drastic decline in activity even if there was no absolute decline in the smoothed data. We have recog-

[4]Burns and Mitchell, *Measuring Business Cycles* (8), pp. 7 and 11.

CHART 3
Major Sectors of Construction: Annual Data and Average Reference-Cycle Standings

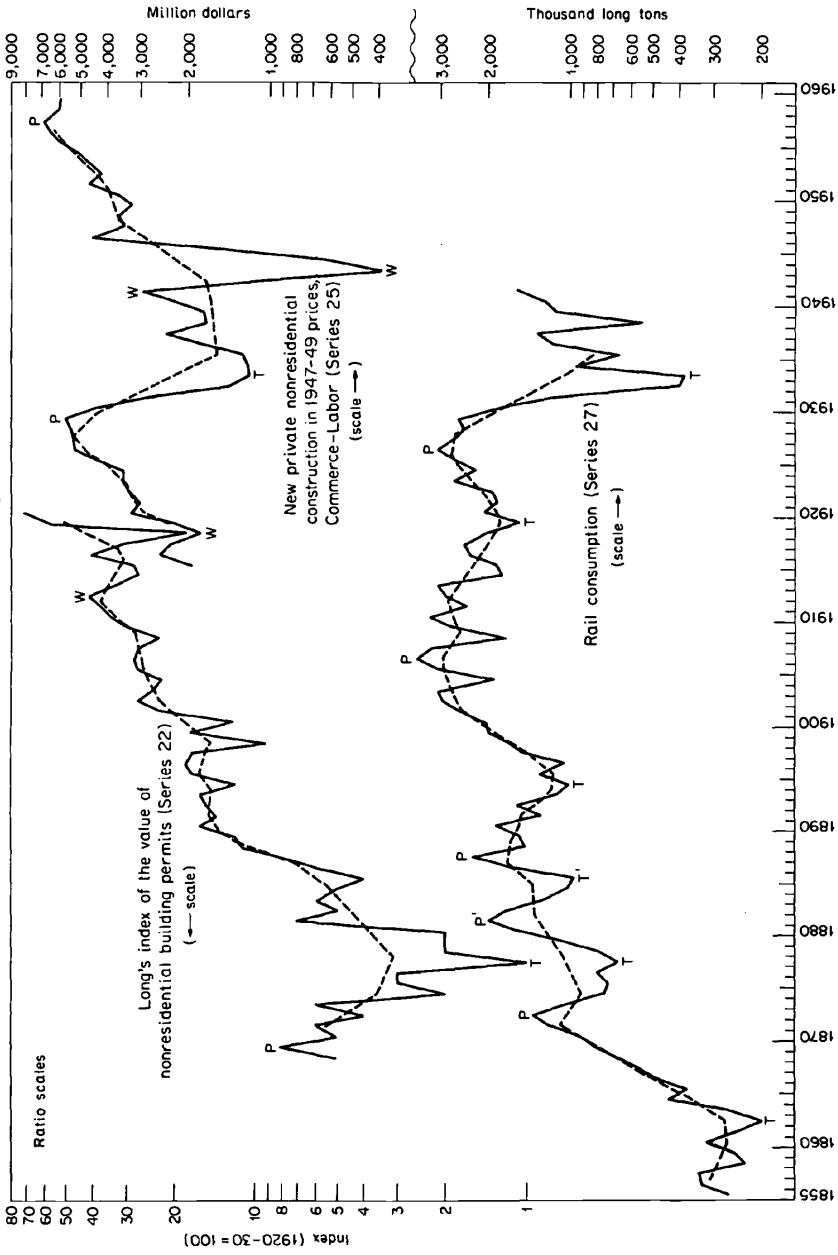
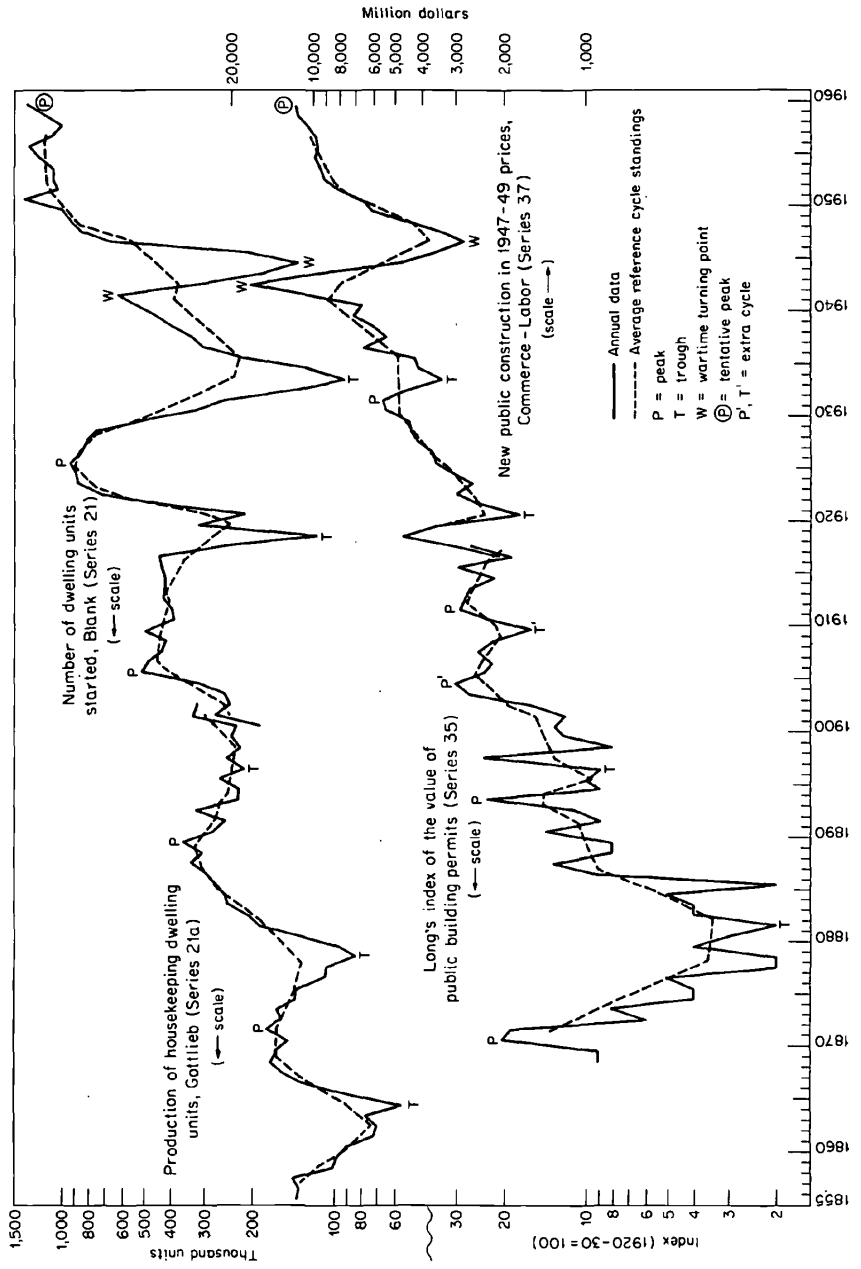


CHART 3 (concluded)



nized ordinary long downswings in the neighborhood of the two wars only if the movements seemed definitely under way before the outbreak of war. Thus, on Chart 1, we treat 1913 as the peak (in the annual data) of an ordinary long swing in Kuznets' estimates of gross new construction in 1929 prices, and we treat the period from 1913 to 1920 as a long downswing in the series. According to these estimates the volume of the output of construction work declined 28 per cent between 1913 and 1915 and 31 per cent between 1913 and 1917, when this country entered the war. No such large declines had occurred in the series since the 1890's.

The long swings marked off by this procedure are identified by the dates of their turning points. Table 4 is a chronology of the peaks and troughs of long swings in the level of the various construction series as these appear from the annual data, while Table 5 provides the same information for turning points selected from smoothed data. A superficial inspection of Table 4 presents a picture of long swings in aggregate construction and in its several sectors which will seem generally familiar to readers acquainted with the standard long-term building series that refer only to residential building or to total urban building. Making allowance for the fact that only a few series start as early as the Civil War and that many end in the 1930's or sooner, it seems right to say that the familiar chronology emerges from these tables. Troughs cluster in the late 1850's and early 1860's, the late 1870's, the late 1890's, the period 1918-20, and the early and middle 1930's. Peaks cluster in the early 1870's, the late 1880's and early 1890's, the period 1909-13, and in the middle and late 1920's. From the troughs of the 1930's, construction activity on the whole seems to have risen, until very recent years, in a long upswing which was broken (in most cases) by a severe decline during World War II. Not only do the turning points cluster at the familiar dates, but the table records the occurrence of only a few "extra" long swings, additional to those whose turning dates are explicitly set forth in the table. Indeed, such extra swings were recorded in only five of the thirty-eight series, and in each only one such movement appears. Moreover, four of the five extra movements reflect the same episode, the serious decline of railroad and telegraph investment from about 1881 to 1885.[5]

[5]Quantitatively, only the decline of railroad investment was important for total construction or for the gross capital expenditures of all public utilities.

TABLE 4

CHRONOLOGY OF PEAKS AND TROUGHS OF LONG SWINGS IN CONSTRUCTION, BASED ON TURNING POINTS IN ANNUAL DATA, 1858-1959

Series	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak
A. Aggregate Construction												
1. Gross new construction in current prices, Kuznets		1873[a]	1878[a]	1892	1896	1913	1915	1926	1933	1942[b]	1944[b]	1959[c]
2. Gross new construction in 1929 prices, Kuznets		-	-	1892	1899	1913	1920	1926	1933	1942[b]	1944[b]	1959[c]
3. Index of the value of construction in current prices, NBER		1871	1878	1892	1898	1912	1918[c]					
4. Index of the value of construction in constant prices, NBER		1871	1878	1892	1898	1912	1918[c]					
5. Index of the physical volume of construction, NBER	1861	1871	1878	1887	1896	1916[b]	1918[b,c]					
6. Total construction in current prices, Commerce-Labor							1915[c]	1927	1933	1942[b]	1944[b]	1959[c]
7. New construction in current prices, Commerce-Labor							1915[c]	1926	1933	1942[b]	1944[b]	1959[c]
8. New construction in 1947-49 prices, Commerce-Labor							1920	1927	1933	1942[b]	1944[b]	1959[c]
B. Total Urban Building												
9. Riggleman's value of permits per capita in current prices	1862	1871	1878	1890	1900	1909	1918	1925	1933[c]			
10. Riggleman's index adjusted for trend	1864	1871	1878	1890	1900	1909	1918	1925	1933[c]			
11. Riggleman-Isard index of value of permits	1862	1871	1878	1890	1900	1916[b]	1918[b]	1925	1933[c]			
12. Long's index of the value of all permits		1871	1878	-	-	1916[b]	1918[b]	1925	1933			
13. Long's index of the number of all permits	1858	1871	1880	1886	1900	1916[b]	1918[b]	1925	1934			
14. Long's index of the value of all permits, as adjusted by Colean and Newcomb		1871	1877	-	-	1916[b]	1918[b]	1925	1933			
15. Colean-Newcomb index of the value of new building in current prices	1862	1870	1878	-	-	-	-	1927	1933	1942[b]	1944[b]	
16. Colean-Newcomb index of the value of new building in constant prices	1863	1870	1877	-	-	1912	1920	1927	1933[c]			

(continued)

TABLE 4 (continued)

Series	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak
C. Nonfarm Residential Building												
17. Long's index of the value of residential permits		1871	1877	1886	1902	1905	1918	1925	1934			
18. Long's index of the number of residential permits	1858	1871	1880	1889	1900	1909	1918	1925	1934			
19. Expenditures for new dwelling units in current prices, Blank				1889[c]	1900	1909[b]	1918[b]	1926	1933	1941[b]	1944[b]	1959[c]
20. Expenditures for new dwelling units in 1929 prices, Blank				1892	1900	1905	1918	1925	1933	1941[b]	1944[b]	1959[c]
21. Number of dwelling units started, Blank				1892	1900	1905	1918	1925	1933	1941[b]	1944[b]	1959[c]
21a. Production of housekeeping dwelling units, Gottlieb	1864	1871	1878	1889	1896	1909[b]	1918	1925	1933			
D. Private Nonresidential Building												
22. Long's index of the value of nonresidential permits		1869	1877	-	-	1912[b]	1918[b]	1925	1933			
23. Long's index of the number of nonresidential permits	1861	1872	1880	1889	1900	-	-	1924	1933			
24. New private nonresidential construction in current prices, Commerce-Labor							1915[c]	1929	1933	1941[a,b]	1943[a,b]	1957
25. New private nonresidential construction in 1947-49 prices, Commerce-Labor							1918	1929	1933	1941[a,b]	1943[a,b]	1957
E. Farm Construction												
26. New farm construction in 1947-49 prices, Commerce-Labor						1919	1921	1927	1932	1941[a,b]	1945[a,b]	1952[d]
F. Transportation and Other Public Utilities Construction												
27. Rail consumption	1862	1872	1877	1887[e]	1894	1906	1919	1926	1933			
28. Increase in wire mileage, Western Union Telegraph Co.[f]		1873.5	1874.5	1887.5[e]	1894.5	1905.5	1918	1927	1931			
29. Increase in wire mileage, all telephone systems			1886	-	-	1917[b]	1919[b]	1929	1933	1941[a,b]	1943[a,b]	1957[c]

(continued)

TABLE 4 (concluded)

Series	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak
F. Transportation and Other Public Utilities Construction (continued)												
30. Gross capital expenditures in 1929 prices, all regulated industries, Ulmer		1871	1875	1893[e]	1896	1910	1919	1929	1933	1941[a,b]	1943[a,b]	
31. Gross capital expenditures in current prices, all regulated industries, Ulmer		1871	1876	1893[e]	1896	1910	1915	1929	1933	1941[a,b]	1943[a,b]	
32. New private public utilities construction in 1947-49 prices, Commerce-Labor							1921	1930	1933	1941[a,b]	1943[a,b]	1957
33. New private public utilities construction in current prices, Commerce-Labor							1915[c]	1929	1933	1941[a,b]	1943[a,b]	1957
G. Shipbuilding												
34. Tonnage of merchant vessels built in the U.S.[f]	1858.5	1863.5	1885.5	1890.5	1894.5	1907.5	1914.5	1919.5[b]	1934.5[b]	1943[a,b]		
H. Public Construction												
35. Long's index of the value of public building permits		1870	1881	1893	1896	1911[e]	1918	1929	1933			
36. New public construction in current prices, Commerce-Labor							1920	1930	1933	1942[b]	1946[b]	1959[c]
37. New public construction in 1947-49 prices, Commerce-Labor							1920	1931[a]	1933[a]	1942[b]	1946[b]	1959[c]

Source: See Appendix A, Part I, Table A-1, and Part II.

[a] Not matched by decline in smoothed data (see Table 5).

[b] Peaks and troughs of major wartime contractions.

[c] Tentative turning point marked at beginning or end of a series (see accompanying text).

[d] The trough that follows in 1958 is not shown in the table.

[e] An extra, less prominent, movement intervenes between the turn marked and the one preceding. These extra movements, by series number, are:

27. peak 1881, trough 1885
28. peak 1880.5, trough 1884.5
30. peak 1881, trough 1885
31. peak 1881, trough 1885
35. peak 1904, trough 1909

[f] Series 28 is a fiscal year series through 1913; series 34, through 1939. Dates carry a decimal to indicate that they are centered at December 31. Thus, 1874.5 means an 1874/75 fiscal year centered at December 31, 1874.

Note: Blank space indicates data not available. Dash indicates cycle skipped.

TABLE 5

CHRONOLOGY OF PEAKS AND TROUGHS OF LONG SWINGS IN CONSTRUCTION, BASED ON TURNING POINTS IN SMOOTHED DATA, 1858-1956

Series	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak
A. Aggregate Construction												
1. Gross new construction in current prices, Kuznets			-	1891	1897	1912.5	1915.5	1927.5	1935	1940.5[b]	1942[b]	1956[c]
2. Gross new construction in 1929 prices, Kuznets			-	1892.5	1897	1911.5	1920	1927.5	1935	1940.5[b]	1946[b]	1956[c]
3. Index of the value of construction in current prices, NBER[d]			1877.5	1891 1892.5	1897	1911.5						
4. Index of the value of construction in constant prices, NBER[d]			1877.5	1891 1892.5	1898	1911.5						
5. Index of the physical volume of construction, NBER[d]	1859.5	1871	1877.5	1888.5	1895[c] 1898	1911.5[b]						
6. Total construction in current prices, Commerce-Labor								1927.5	1935	-	-	1956[c]
7. New construction in current prices, Commerce-Labor								1927.5	1935	1940.5[b]	1942[b]	1956[c]
8. New construction in 1947-49 prices, Commerce-Labor							1920	1927.5	1935	1940.5[b]	1946[b]	1956[c]
B. Total Urban Building												
9. Riggleman's value of permits per capita in current prices	1862	1868.5	1877.5	1889.5	1898	1909.5	1916.5	1924.5				
10. Riggleman's index adjusted for trend	1864	1871	1877.5	1891	1901	1909.5[b]	1919	1925.5				
11. Riggleman-Isard index of value of permits	1862	1871	1877.5	1891	1898	1911.5[b]	1916.5[b]	1925.5				
12. Long's index of the value of all permits		1871[c]	1877.5	-	-	1911.5[b]	1916.5[b]	1925.5				
13. Long's index of the number of all permits	1858[c]	1871	1881.5	1886.5	1901	1911.5[b]	1916.5[b]	1924.5				
14. Long's index of the value of all permits, as adjusted by Colean and Newcomb		1871[c]	1877.5	-	-	1911.5[b]	1915.5[b]	1925.5				
15. Colean-Newcomb index of the value of new building in current prices	1862	1871	1877.5	-	-	-	-	1927.5	1935			
16. Colean-Newcomb index of the value of new building in constant prices	1862	1871	1877.5	-	-	1911.5	1920	1927.5				

(continued)

TABLE 5 (continued)

Series	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak
C. Nonfarm Residential Building												
17. Long's index of the value of residential permits		1871[c]	1874	1886.5	1901	1909.5	1916.5	1925.5				
18. Long's index of the number of residential permits	1858[c]	1871	1881.5	1889.5	1901	1909.5	1919	1924.5				
19. Expenditures for new dwelling units in current prices, Blank				-	1901	1908.5[b]	1916.5[b]	1925.5	1935	1940.5[b]	1942[b]	1956[c]
20. Expenditures for new dwelling units in 1929 prices, Blank				1891[c]	1901	1906	1919	1925.5	1935	1940.5[b]	1942[b]	1956[c]
21. Number of dwelling units started, Blank				1891[c]	1901	1906	1919	1924.5	1935	1940.5[b]	1942[b]	1955
21a. Production of housekeeping dwelling units, Gottlieb	1862	1868.5	1877.5	1888.5	1898	1909.5[b]	1919[b]	1924.5	1935[c]			
D. Private Nonresidential Building												
22. Long's index of the value of nonresidential permits		1871[c]	1877.5	-	-	1911.5[b]	1915.5[b]	1925.5				
23. Long's index of the number of nonresidential permits	1859.5	1871	1881.5	1888.5	1898	-	-	1924.5				
24. New private nonresidential construction in current prices, Commerce-Labor							-	1927.5	1935	-	-	1956[c]
25. New private nonresidential construction in 1947-49 prices, Commerce-Labor							1919[c]	1927.5	1935	-	-	1956[c]
E. Farm Construction												
26. New farm construction in 1947-49 prices, Commerce-Labor						1919[c]	1922.5	1927.5	1933	-	-	1950.5
F. Transportation and Other Public Utilities Construction												
27. Rail consumption	1859.5	1871	1874	1886.5	1895	1906	1919	1925.5	1935[c]			
28. Increase in wire mileage, Western Union Telegraph Co.[f]		-	-	1888[e]	1894.5	1904.5	1916.5	1927.5	1933			
29. Increase in wire mileage, all telephone systems			1884.5[c]	-	-	1912.5[b]	1919[b]	1927.5	1935	-	-	1955[c]

(continued)

TABLE 5 (concluded)

Series	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak
F. Transportation and Other Public Utilities Construction (continued)												
30. Gross capital expenditures in 1929 prices, all regulated industries, Ulmer			1877.5	1892.5[e]	1895	1911.5	1919	1927.5	1935	-	-	
31. Gross capital expenditures in current prices, all regulated industries, Ulmer			1877.5	1892.5[e]	1895	1911.5	1915.5	1924.5	1935	-	-	
32. New private public utilities construction in 1947-49 prices, Commerce-Labor							1920	1927.5	1935	-	-	1955
33. New private public utilities construction in current prices, Commerce-Labor							1919[c]	1927.5	1935	-	-	1956[c]
G. Shipbuilding												
34. Tonnage of merchant vessels built in the U.S.[f]	1859	1866	1886	1890.5	1894.5	1901.5	1911	1919.5[b]	1934.5[b]	1942[b]		
H. Public Construction												
35. Long's index of the value of public building permits		1871[c]	1881.5	1892.5	1895	1911.5[e]	1919	1927.5				
36. New public construction in current prices, Commerce-Labor							1920	1929.5	1933	1940.5[b]	1946[b]	1956[c]
37. New public construction in 1947-49 prices, Commerce-Labor							1920	-	-	1940.5[b]	1946[b]	1956[c]

Source: Appendix A, Part I, Table A-2.

[a]For explanation of smoothing, see accompanying text and charts. The ordinates of the smoothed data in some cases refer to periods centered at the end rather than at the middle of a calendar year. In these cases a decimal is added. Thus, 1912.5 means December 31, 1912, while 1897 is an ordinary calendar year centered at June 30.

[b]Peaks and troughs of major wartime contractions.

[c]Tentative turning point marked at beginning or end of a series (see accompanying text).

[d]This series is composed of two segments that are not completely comparable. The second segment is probably the more reliable.

[e]An extra, less prominent, movement intervenes between the turn marked and the one preceding. These extra movements, by series number, are:

28. peak 1881, trough 1884
30. peak 1881.5, trough 1884.5
31. peak 1881.5, trough 1884.5
35. peak 1905, trough 1908.5

NOTES TO TABLE 5 (concluded)

[f]First segment is given in fiscal years. Fiscal-year dates have been adjusted to a calendar-year basis. Thus, a turning point falling in fiscal-year 1905 is shown in the table as 1904.5, that is, in a year centered on December 31, 1904. Correspondingly, a turning point falling in fiscal-year 1895.5 is shown in the table as 1895, that is, in a year centered on June 30, 1895; and so on.

Note: Blank space indicates data not available. Dash indicates cycle skipped.

This suggestion that the familiar fifteen- to twenty-five-year residential building cycles were widely diffused through other sectors of construction, that the long-swing turning points in the various sectors were fairly closely clustered, and that the swings were characteristic of the aggregate of all construction is subject to a number of qualifications. In the first place, long-cycle movements were skipped by one series of nonresidential building in the 1890's and by another in the period before World War I. Further, a number of series representing total urban building skip the same movements. In these two divisions, indeed, the dashes in the table would be more numerous if it were not for the "wartime" turning points of the World War I decline. It is right to remember, however, that three of the series in this class which skip cycles (Series 14-16) have been adjusted by their compilers to reduce the amplitude of their movements (see Appendix A, Part III). Finally, although the series representing aggregate construction appear to present a full complement of long swings, the facts are somewhat less impressive than the data may suggest. First, the Kuznets estimates in constant prices do not display a long-swing decline in the 1870's; and while there is some reason to think that this series may not represent the situation accurately in this period,[6] its performance casts at least

[6]There is reason to believe that the Census data for 1869, because of failures in coverage, were low relative to those for 1879. The trend of Kuznets' estimates during the 1870's is determined by benchmark figures for output of construction materials drawn from these Censuses. Various authorities put the relative understatement of 1869 relative to 1879 at between 10 and 22 per cent (see Appendix A, Part III). These difficulties reflect the failure of the Census to achieve its designed coverage. In addition, during the 1870's, the commercial production of building materials, particularly bricks and lumber, was still gaining at the expense of household production. Even if the Census had met its designed coverage goals consis-

some doubt on the reality of a long building depression.[7] In addition, one index of aggregate construction (Series 5) showed no evidence of a long-swing decline in its absolute level in the period before World War I.

The showing of Table 4, then, suggests that in the period since the Civil War there was probably a succession of long cycles in aggregate construction widely diffused through its various sectors. This, however, is at best only a tentative suggestion. The chronologies of turning points on which it is based need to be verified by establishing the duration, amplitude, and other characteristics of the long swings which the turning points mark off. Furthermore, these tables of turning points leave us in doubt on two counts. First, they suggest that there may not have been declines in the absolute level of private nonresidential building in the 1890's and in the period before World War I. This question carries over to some of the measures of total urban building, of which nonresidential building is a principal component. Secondly, so far as concerns aggregate construction, the statistical witnesses for the existence of long-swing declines in the absolute level of construction in the 1870's and in the period before World War I are not unanimous. In the seventies, there is some presumption that there was a significant decline in the total because the evidence of the aggregate series is bolstered by the almost completely congruent behavior of the various sectoral measures. Before World War I, however, the waves in the several sectors were less nearly in phase. We go on, therefore, to try to establish certain of the characteristics of the long swings identified in these chronologies and to discern the similarity and dissimilarity of their movement more clearly.

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tently, therefore, it would have overstated the true upward trend in the output of building materials at least slightly. Finally, the series available for interpolating between Census dates were particularly inadequate in this decade.

[7]Strictly speaking, since the smoothed Kuznets series in current prices failed to drop in this period, we should disregard a downswing in the annual data. In the seventies, however, the business-cycle contraction, according to the National Bureau chronology, was so protracted that our method of smoothing may eliminate much of a possible long-swing decline.