Appendix A
Construction Statistics for the Period Since the Civil War

This appendix is divided into three parts. Part I shows the basic data for the thirty-eight series on which the study mainly rests. Table A-1 records the unprocessed annual data; Table A-2 gives the smoothed data, that is, the average standings of each series during successive reference cycles, and Table A-3 presents the per annum rates of change between reference-cycle standings. Readers should consult pages 22 and 100 above for a description of how the reference-cycle standings and per annum rates of change were computed. Part II provides brief notes on the sources from which the thirty-eight series were drawn. Part III describes the bases for the various series and discusses and evaluates their weaknesses.

Part I: Basic Data

TABLE A-1

ANNUAL DATA FOR THIRTY-EIGHT CONSTRUCTION SERIES

PART A. AGGREGATE CONSTRUCTION
(dollars in millions)

Year	Gross New Construction, Kuznets		INDEX OF VALUE OF CONSTRUCTION, NBER				Series 5: Index of Physical Volume of Construction, NBER		Series 6: Total Construction (Commerce-Labor, current prices)	Series 7: New Construction (Commerce-Labor, current prices)	Series 8: New Construction (Commerce-Labor, 1947-49 prices)
	Series 1: Current Prices	Series 2: 1929 Prices	Series 3: Current Prices		Series 4: Constant Prices						
			Seg. I (1870-97 =100)	Seg. II (1889-1918 =100)	Seg. I (1870-97 =100)	Seg. II (1889-1918 =100)	Seg. I (1856-97 =100)	Seg. II (1889-1918 =100)			
1853											
1854											
1855							59.4				
1856							54.9				
1857							46.1				
1858							59.6				
1859											
1860							61.4				
1861							38.5				
1862							60.8				
1863							77.4				
1864							53.7				
1865							69.7				
1866							90.7				
1867							105.0				
1868							122.3				
1869							137.8				

(continued)

TABLE A-1 (continued)

PART A (continued)

Year	Gross New Construction, Kuznets[a]		INDEX OF VALUE OF CONSTRUCTION, NBER				Series 5: Index of Physical Volume of Construction, NBER		Series 6: Total Construction (Commerce-Labor, current prices)	Series 7: New Construction (Commerce-Labor, current prices)	Series 8: New Construction (Commerce-Labor, 1947-49 prices)
	Series 1: Current Prices	Series 2: 1929 Prices	Series 3: Current Prices		Series 4: Constant Prices						
			Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Seg. I (1856-97 = 100)	Seg. II (1889-1918 = 100)			
1870			133.2		119.6		138.1				
1871			148.4		131.8		162.3				
1872			123.2		102.1		159.2				
1873			108.4		88.1		134.0				
1874			58.9		51.7		87.5				
1875			53.0		48.7		85.4				
1876			45.5		43.7		78.7				
1877			43.1		44.5		75.0				
1878			38.4		41.9		66.2				
1879			43.8		48.4		72.3				
1880			68.0		68.1		76.0				
1881			96.3		95.4		98.4				
1882			103.0		97.8		94.3				
1883			98.3		93.9		91.8				
1884			88.1		86.3		93.0				
1885			93.8		93.6		106.2				
1886			110.9		110.1		132.4				
1887			126.0		127.1		158.6				
1888	1,645	3,735	119.6		119.1		131.7				
1889			138.7	67.1	139.4	77.2	151.6	87.9			
1890	2,393	5,451	146.2	71.3	147.2	83.1	154.8	88.4			
1891	2,141	5,033	131.0	61.1	136.1	73.9	119.9	75.0			
1892	2,718	6,570	157.8	79.8	168.8	99.9	141.6	93.8			
1893	2,190	5,338	132.8	73.9	143.4	93.3	106.6	67.2			
1894	2,093	5,300	97.9	58.7	109.4	76.1	100.4	67.0			

(continued)

TABLE A-1 (continued)

PART A (continued)

Year	Gross New Construction, Kuznets[a] Series 1: Current Prices	Series 2: 1929 Prices	INDEX OF VALUE OF CONSTRUCTION, NBER Series 3: Current Prices Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Series 4: Constant Prices Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Series 5: Index of Physical Volume of Construction, NBER Seg. I (1856-97 = 100)	Seg. II (1889-1918 = 100)	Series 6: Total Construction (Commerce-Labor, current prices)	Series 7: New Construction (Commerce-Labor, current prices)	Series 8: New Construction (Commerce-Labor, 1947-49 prices)
1895	2,192	5,598	109.7	62.2	123.1	80.7	119.8	76.6			
1896	1,875	4,744	89.9	58.9	99.9	75.7	105.3	66.4			
1897	2,088	5,493	96.1	60.7	111.0	80.3	121.3	73.7			
1898	1,982	5,118		52.4		67.5		70.0			
1899	2,069	4,866		68.5		81.4		77.7			
1900	2,421	5,562		57.1		65.6		61.9			
1901	2,705	6,241		75.9		88.1		85.6			
1902	3,107	6,964		81.4		92.1		86.2			
1903	3,063	6,632		82.6		90.8		92.0			
1904	3,023	6,625		87.7		96.6		89.6			
1905	3,327	6,968		122.3		127.9		134.6			
1906	3,951	7,615		135.0		131.0		139.2			
1907	4,342	8,049		133.5		125.3		127.3			
1908	3,891	7,496		125.7		121.6		104.9			
1909	4,467	8,471		147.0		137.6		128.3			
1910	4,425	8,234		149.4		137.4		130.2			
1911	4,144	7,678		149.2		136.9		122.9			
1912	4,546	8,280		159.9		144.0		132.7			
1913	4,988	8,879		149.1		132.4		132.5			
1914	3,659	6,701		128.7		115.9		119.9			
1915	3,509	6,363		122.1		107.8		129.5	4,973	3,262	11,503
1916	4,162	6,783		145.6		116.3		144.5	5,657	3,849	12,247
1917	4,641	6,090		140.3		92.2		110.4	6,496	4,569	11,811
1918	5,126	5,676		93.3		51.1		83.5	7,365	5,118	11,124
1919	6,396	6,300							8,857	6,296	12,129

(continued)

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TABLE A-1 (continued)

PART A (continued)

Year	Gross New Construction, Kuznets[a] Series 1: Current Prices	Gross New Construction, Kuznets[a] Series 2: 1929 Prices	INDEX OF VALUE OF CONSTRUCTION, NBER Series 3: Current Prices Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Series 4: Constant Prices Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Series 5: Index of Physical Volume of Construction, NBER Seg. I (1856-97 = 100)	Seg. II (1889-1918 = 100)	Series 6: Total Construction (Commerce-Labor, current prices)	Series 7: New Construction (Commerce-Labor, current prices)	Series 8: New Construction (Commerce-Labor, 1947-49 prices)
1920	6,727	5,414							9,731	6,749	10,546
1921	6,359	6,341							8,867	6,004	11,621
1922	8,016	8,768							10,607	7,647	16,203
1923	9,732	9,653							12,541	9,332	17,928
1924	10,792	10,752							13,787	10,407	20,099
1925	11,891	12,066							14,972	11,439	22,504
1926	12,584	12,773							15,833	12,082	23,752
1927	12,439	12,699							15,960	12,034	23,787
1928	11,988	12,268							15,618	11,641	23,036
1929	11,193	11,193							14,994	10,793	20,853
1930	9,041	9,352							12,615	8,741	17,440
1931	6,627	7,457							9,659	6,427	13,977
1932	3,738	4,845							6,114	3,538	8,892
1933	3,079	3,673							5,357	2,879	6,631
1934	3,920	4,214							6,662	3,720	7,725
1935	4,532	5,026							7,377	4,232	9,081
1936	6,797	7,295							10,292	6,497	13,489
1937	7,499	7,540							10,894	6,999	13,620
1938	7,380	7,385							10,864	6,980	13,492
1939	8,566	8,683							12,176	8,198	16,080
1940	9,080	9,065							12,801	8,682	16,767
1941	12,380	11,642							16,442	11,957	21,714
1942	14,381	12,115							18,676	14,075	22,852
1943	8,648	6,926							13,299	8,301	12,812
1944	5,785	4,593							10,575	5,259	8,174

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TABLE A-1 (continued)

PART A (concluded)

| | Gross New Construction, Kuznets | | INDEX OF VALUE OF CONSTRUCTION, NBER | | | | Series 5: Index of Physical Volume of Construction, NBER | | | | |
| | | | Series 3: Current Prices | | Series 4: Constant Prices | | | | Series 6: Total Construction (Commerce-Labor, current prices) | Series 7: New Construction (Commerce-Labor, current prices) | Series 8: New Construction (Commerce-Labor, 1947-49 prices) |
Year	Series 1: Current Prices	Series 2: 1929 Prices	Seg. I (1870-97 =100)	Seg. II (1889-1918 =100)	Seg. I (1870-97 =100)	Seg. II (1889-1918 =100)	Seg. I (1856-97 =100)	Seg. II (1889-1918 =100)			
1945	6,407	4,919							11,905	5,809	8,681
1946	13,280	8,829							20,689	12,627	16,346
1947	18,674	10,317							28,275	17,901	19,070
1948	24,302	12,053							35,044	23,243	22,259
1949	25,237	12,756							36,149	24,183	23,544
1950	31,208	15,099							42,031	29,947	27,972
1951	34,191	15,342							46,086	32,700	28,289
1952	36,353	15,799							48,823	34,670	29,051
1953	38,883	16,564							51,398	37,019	30,375
1954	41,405	17,740							54,028	39,362	32,395
1955	46,485	19,326							60,007	44,164	35,334
1956	48,224	19,069							62,757	45,779	34,681
1957	50,082	19,177							65,715	47,795	34,944
1958	50,940	19,351							66,663	48,956	35,391
1959	56,339	20,938							73,391	54,109	38,226

TABLE A-1 (continued)

PART B. TOTAL URBAN BUILDING

Year	Riggleman's Value of Building Permits Per Capita		Series 11: Series 9 as Adjusted by Isard (1920-29=100)	Long's Index of All Permits		Series 14: Series 12 as Adjusted by Colean and Newcomb (1920-29=100)	Colean-Newcomb Index of Value of New Building	
	Series 9: Current Prices (dollars)	Series 10: 1913 Prices as Percentage of Trend		Series 12: Value (1920-30=100)	Series 13: Number (1920-30=100)		Series 15: Current Prices (1920-29=100)	Series 16: Constant Prices (1913=100)
1853			5.96					28.6
1854			6.07					28.6
1855	24.05	149.7	5.94		21		6.2	34.5
1856	25.04	152.9	6.46		18		6.4	34.9
1857	24.91	140.6	6.70		18		5.7	28.8
1858	14.46	89.7	3.95		22		5.1	28.4
1859	16.17	95.9	4.61				4.6	24.5
1860	17.83	102.5	5.29		27		4.5	23.2
1861	12.06	67.9	3.68		18		4.1	20.7
1862	10.68	58.8	3.34		26		4.1	20.3
1863	16.80	70.7	5.34		28		4.2	15.9
1864	11.37	42.2	3.91		16		5.1	17.0
1865	17.77	60.6	6.10		22		6.3	19.4
1866	25.33	82.2	8.92		29		8.5	24.9
1867	29.55	95.3	10.55		38		10.9	31.8
1868	34.33	110.2	13.25	10	47	8	12.9	37.5
1869	37.53	119.1	14.88	11	54	10	14.0	40.2

(continued)

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TABLE A-1 (continued)

PART B (continued)

Year	Riggleman's Value of Building Permits Per Capita		Series 11: Series 9 as Adjusted by Isard (1920-29=100)	Long's Index of All Permits		Series 14: Series 12 as Adjusted by Colean and Newcomb (1920-29=100)	Colean-Newcomb Index of Value of New Building	
	Series 9: Current Prices (dollars)	Series 10: 1913 Prices as Percentage of Trend		Series 12: Value (1920-30=100)	Series 13: Number		Series 15: Current Prices (1920-29=100)	Series 16: Constant Prices (1913=100)
1870	33.93	119.0	13.79	10	52	8	14.7	46.8
1871	37.69	126.6	15.41	12	62	10	13.8	42.1
1872	29.31	98.6	12.30	8	52	7	13.2	40.3
1873	27.80	95.5	11.97	7	47	7	10.2	31.9
1874	22.12	81.6	6.42	5	30	4	8.2	27.6
1875	20.27	82.2	6.22	6	29	5	5.9	21.8
1876	16.19	68.1	5.12	5	25	4	5.3	20.3
1877	13.94	62.9	4.55	4	26	3	4.5	18.5
1878	11.58	55.1	3.90	4	19	4	4.3	18.7
1879	13.03	64.1	4.53	6	19	5	5.0	22.5
1880	15.71	71.0	5.64	8	14	6	7.0	29.0
1881	19.33	82.3	7.33	11	18	10	10.0	39.0
1882	22.91	92.8	8.99	12	20	10	11.0	40.9
1883	24.94	100.5	10.13	12	24	10	11.0	40.7
1884	23.51	105.7	9.97	11	27	9	10.0	41.3
1885	26.33	118.6	11.60	12	33	9	11.0	45.6
1886	29.03	122.3	13.24	16	37	13	13.0	50.4
1887	29.84	126.0	14.40	17	34	13	14.0	54.5
1888	27.58	120.4	13.83	15	30	13	15.0	60.4
1889	32.93	143.4	17.06	19	36	15	16.0	64.4

(continued)

Year	Riggleman's Value of Building Permits Per Capita		Series 11: Series 9 as Adjusted by Isard (1920-29=100)	Long's Index of All Permits		Series 14: Series 12 as Adjusted by Colean and Newcomb (1920-29=100)	Colean-Newcomb Index of Value of New Building	
	Series 9: Current Prices (dollars)	Series 10: 1913 Prices as Percentage of Trend		Series 12: Value (1920-30=100)	Series 13: Number (1920-30=100)		Series 15: Current Prices (1920-29=100)	Series 16: Constant Prices (1913=100)
1890	35.35	158.0	18.11	21	34	18	17.0	70.3
1891	29.85	137.8	15.75	16	30	14	17.0	72.7
1892	30.73	141.7	17.02	18	35	16	16.0	68.4
1893	22.58	103.8	12.87	16	26	15	16.0	68.2
1894	19.70	92.9	11.56	14	24	13	16.0	70.1
1895	25.22	117.8	15.26	20	27	18	17.0	73.8
1896	20.36	97.1	12.64	17	25	17	18.0	79.9
1897	21.36	104.5	13.57	19	26	17	16.0	72.9
1898	18.11	87.2	11.93	14	20	12	17.0	76.3
1899	23.34	101.9	14.89	22	24	19	15.0	61.1
1900	17.36	70.4	11.69	13	17	12	18.0	68.3
1901	25.58	99.2	17.72	21	23	20	19.0	68.9
1902	25.22	97.5	17.99	19	22	21	21.0	75.9
1903	24.88	95.8	18.29	19	24	20	22.0	79.4
1904	29.15	107.8	22.09	24	29	22	25.0	86.7
1905	37.94	135.2	29.66	36	39	31	30.0	100.3
1906	39.61	134.4	31.92	34	42	30	31.0	98.8
1907	35.66	114.2	29.63	28	39	27	28.0	84.3
1908	30.84	102.2	26.43	24	37	22	29.0	90.4
1909	40.43	143.1	35.68	36	46	33	31.0	103.3

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Year	Riggleman's Value of Building Permits Per Capita		Series 11: Series 9 as Adjusted by Isard (1920-29=100)	Long's Index of All Permits		Series 14: Series 12 as Adjusted by Colean and Newcomb (1920-29=100)	Colean-Newcomb Index of Value of New Building	
	Series 9: Current Prices (dollars)	Series 10: 1913 Prices as Percentage of Trend		Series 12: Value (1920-30=100)	Series 13: Number (1920-30=100)		Series 15: Current Prices (1920-29=100)	Series 16: Constant Prices (1913=100)
1910	37.42	124.9	33.97	34	46	33	35.0	110.1
1911	35.28	121.3	32.79	33	46	34	37.0	120.0
1912	37.19	131.5	35.37	36	46	37	36.0	120.3
1913	33.02	105.8	32.12	30	43	30	33.0	100.0
1914	28.97	94.3	28.81	27	42	26	30.0	92.5
1915	29.81	94.5	30.26	30	48	28	33.0	99.1
1916	36.18	100.0	37.56	38	52	38	39.0	102.3
1917	22.70	50.7	24.10	23	36	26	47.0	99.7
1918	13.59	25.4	14.74	11	23	14	52.0	92.2
1919	40.46	60.6	44.84	46	67	48	64.0	91.1
1920	43.19	54.7	48.93	46	58	54	69.0	83.2
1921	52.63	82.9	60.81	60	81	58	61.0	91.6
1922	78.47	142.9	92.49	94	112	85	78.0	135.4
1923	94.10	139.5	113.20	113	133	101	95.0	134.5
1924	93.98	138.3	115.50	122	139	111	106.0	149.1
1925	108.27	165.9	135.95	144	144	136	117.0	171.5
1926	100.54	152.9	128.49	138	128	129	123.0	179.2
1927	87.19	133.7	113.36	117	102	112	123.0	180.8
1928	82.55	126.1	109.16	119	89	115	119.0	174.4
1929	72.54	110.6	97.55	92	67	99	110.0	161.0

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TABLE A-1 (continued)

PART B (concluded)

Year	Riggleman's Value of Building Permits Per Capita		Series 11: Series 9 as Adjusted by Isard (1920-29=100)	Long's Index of All Permits		Series 14: Series 12 as Adjusted by Colean and Newcomb (1920-29=100)	Colean-Newcomb Index of Value of New Building	
	Series 9: Current Prices (dollars)	Series 10: 1913 Prices as Percentage of Trend		Series 12: Value (1920-30=100)	Series 13: Number (1920-30=100)		Series 15: Current Prices (1920-29=100)	Series 16: Constant Prices (1913=100)
1930	39.86	61.9	54.49	54	48	61	89.0	132.9
1931	29.95	52.0	41.55	42	43	45	65.0	108.6
1932	11.20	22.4	15.77	15	20	18	36.0	69.5
1933	8.84	16.3	12.63	8	15	8	29.0	51.7
1934				9	15	11	38.0	
1935				18	23	18	43.0	
1936							66.0	
1937							71.0	
1938							84.0	
1939								
1940							88.0	
1941							122.0	
1942							143.0	
1943							85.0	
1944							54.0	
1945							57.0	
1946							122.0	
1947							170.0	
1948							221.0	
1949							232.0	
1950							293.0	
1951							316.0	

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PART C. NONFARM RESIDENTIAL BUILDING

Year	Long's Index of Residential Permits		Expenditures for New Dwelling Units, Blank		Series 21: Number of Dwelling Units Started, Blank (thousands)	Series 21a: Production of Housekeeping Dwelling Units, Gottlieb (thousands)
	Series 17: Value (1920-30=100)	Series 18: Number	Series 19: Current Prices (million	Series 20: 1929 Prices dollars)		
1853						133
1854						138
1855						138
1856		23				135
1857		19				142
1858		19				103
1859		25				98
1860		30				90
1861		22				72
1862		32				70
1863		31				76
1864		16				57
1865		22				86
1866		31				131
1867		44				153
1868	14	56				171
1869	15	66				162
1870	14	64				148
1871	18	78				175
1872	12	58				158
1873	8	58				162
1874	7	41				140
1875	8	41				139
1876	7	34				109
1877	6	37				107
1878	7	26				84
1879	10	23				97
1880	13	19				135
1881	16	27				189
1882	19	30				205
1883	17	37				244
1884	17	42				252
1885	20	53				273
1886	26	60				294
1887	24	64				335
1888	18	61				309
1889	24	74	806	2,067	342	354
1890	24	70	790	2,015	328	278
1891	18	56	612	1,615	298	252
1892	21	65	763	2,073	381	323
1893	16	50	583	1,589	267	226
1894	16	46	594	1,678	265	225
1895	23	56	679	1,946	309	262
1896	17	49	606	1,726	257	218
1897	21	55	643	1,869	292	247
1898	17	36	574	1,599	262	222
1899	25	38	608	1,579	282	239

(continued)

	Long's Index of Residential Permits		Expenditures for New Dwelling Units, Blank		Series 21: Number of	Series 21a: Production of
					Dwelling	Housekeeping
	Series 17:	Series 18:	Series 19: Current	Series 20: 1929	Units Started,	Dwelling Units,
	Value	Number	Prices	Prices	Blank	Gottlieb
Year	(1920–30=100)		(million dollars)		(thousands)	(thousands)
1900	13	28	433	1,067	189	230
1901	20	36	610	1,521	275	330
1902	13	33	572	1,378	240	320
1903	16	36	607	1,412	253	347
1904	26	48	690	1,624	315	403
1905	43	66	1,154	2,593	507	535
1906	38	72	1,170	2,393	487	524
1907	29	65	1,037	2,029	432	471
1908	24	60	1,034	2,089	416	462
1909	41	79	1,272	2,475	492	576
1910	34	72	1,028	1,932	387	475
1911	30	71	1,000	1,905	395	470
1912	32	66	1,113	2,069	426	508
1913	28	60	1,108	2,135	421	475
1914	27	61	1,081	2,071	421	465
1915	32	69	1,192	2,228	433	472
1916	36	69	1,255	2,202	437	464
1917	16	34	769	1,155	240	290
1918	6	14	391	494	118	169
1919	38	65	1,258	1,366	315	413
1920	27	37	1,072	903	217	250
1921	61	75	1,795	1,882	449	491
1922	105	123	2,955	3,369	716	767
1923	128	143	3,960	4,028	871	950
1924	133	149	4,575	4,721	893	963
1925	151	164	4,910	5,104	937	1,048
1926	147	133	4,920	5,077	849	1,010
1927	117	101	4,540	4,749	810	837
1928	120	87	4,195	4,374	753	741
1929	72	54	3,040	3,040	509	573
1930	38	32	1,570	1,610	330	493
1931	33	31	1,320	1,468	254	379
1932	6	10	485	637	134	200
1933	7	7	290	381	93	139
1934	5	7	380	458	126	188
1935	15	18	710	882	216	330
1936	31	32	1,210	1,437	304	476
1937			1,475	1,574	332	502
1938			1,620	1,682	399	606
1939			2,270	2,316	458	769
1940			2,560	2,517	530	
1941			3,040	2,774	620	
1942			1,440	1,244	301	
1943			710	586	184	
1944			570	431	139	
1945			720	511	208	
1946			3,300	2,114	662	
1947			5,450	2,881	846	
1948			7,500	3,563	914	
1949			7,257	3,552	989	

(continued)

Year	Long's Index of Residential Permits		Expenditures for New Dwelling Units, Blank		Series 21: Number of Dwelling Units Started, Blank (thousands)	Series 21a: Production of Housekeeping Dwelling Units, Gottlieb (thousands)
	Series 17: Value	Series 18: Number	Series 19: Current Prices	Series 20: 1929 Prices		
	(1920-30=100)		(million dollars)			
1950			11,525	5,346	1,352	
1951			9,849	4,245	1,020	
1952			9,870	4,144	1,069	
1953			10,555	4,358	1,068	
1954			12,070	5,019	1,202	
1955			14,990	6,048	1,310	
1956			13,535	5,231	1,094	
1957			12,615	4,787	993	
1958			13,552	5,095	1,142	
1959			17,116	6,230	1,343	

(continued)

	PART D. PRIVATE NONRESIDENTIAL BUILDING				PART E . FARM CONSTRUCTION

	Long's Index of Nonresidential Permits		New Private Nonresi- dential Construction, Commerce-Labor		Series 26: New Farm
	Series 22: Value (1920-30=100)	Series 23: Number	Series 24: Current Prices (million dollars)	Series 25: 1947-49 Prices	Construction, Commerce-Labor, 1947-49 Prices
Year					(million dollars)
1853					
1854					
1855					
1856		16			
1857		16			
1858		12			
1859		16			
1860		12			
1861		4			
1862		12			
1863		23			
1864		16			
1865		23			
1866		28			
1867		26			
1868	5	26			
1869	8	26			
1870	5	26			
1871	6	26			
1872	4	37			
1873	6	26			
1874	2	13			
1875	3	12			
1876	3	12			
1877	1	9			
1878	2	10			
1879	2	12			
1880	2	8			
1881	7	9			
1882	5	9			
1883	6	10			
1884	5	11			
1885	4	12			
1886	6	12			
1887	8	15			
1888	11	14			
1889	12	16			
1890	16	15			
1891	14	13			
1892	15	16			
1893	16	12			
1894	12	13			
1895	17	13			
1896	18	13			
1897	17	11			
1898	9	10			
1899	17	11			

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PART D (continued)   PART E (continued)

Year	Long's Index of Nonresidential Permits		New Private Nonresidential Construction, Commerce-Labor		Series 26: New Farm Construction, Commerce-Labor, 1947-49 Prices (million dollars)
	Series 22: Value (1920-30=100)	Series 23: Number	Series 24: Current Prices	Series 25: 1947-49 Prices (million dollars)	
1900	12	9			
1901	22	13			
1902	27	14			
1903	24	16			
1904	22	17			
1905	27	20			
1906	28	21			
1907	27	21			
1908	23	19			
1909	30	20			
1910	34	28			
1911	37	29			
1912	41	29			
1913	33	28			
1914	27	29			
1915	28	34	478	1,949	781
1916	40	41	716	2,551	975
1917	32	36	800	2,331	1,127
1918	18	32	731	1,819	991
1919	56	70	1,082	2,249	1,138
1920	71	75	1,964	3,245	902
1921	59	83	1,434	3,089	489
1922	80	103	1,457	3,343	577
1923	93	121	1,697	3,500	652
1924	106	129	1,675	3,472	607
1925	136	128	2,060	4,331	623
1926	127	122	2,513	5,250	596
1927	116	106	2,534	5,349	714
1928	118	93	2,573	5,423	676
1929	118	80	2,694	5,664	622
1930	76	60	2,003	4,475	409
1931	54	52	1,099	2,776	238
1932	26	29	502	1,439	105
1933	8	22	406	1,199	139
1934	14	23	456	1,207	166
1935	21	28	472	1,255	314
1936	24	35	713	1,812	394
1937			1,085	2,393	480
1938			764	1,717	407
1939			786	1,780	508
1940			1,025	2,221	574
1941			1,482	2,941	665
1942			635	1,133	493
1943			233	393	473
1944			351	599	424

PART D (concluded)   PART E (concluded)

Year	Long's Index of Nonresidential Permits		New Private Nonresidential Construction, Commerce-Labor		Series 26: New Farm Construction, Commerce-Labor, 1947-49 Prices (million dollars)
	Series 22: Value (1920-30=100)	Series 23: Number	Series 24: Current Prices	Series 25: 1947-49 Prices	
			(million dollars)		
1945			1,020	1,639	378
1946			3,362	4,512	1,097
1947			3,243	3,479	1,459
1948			3,765	3,614	1,485
1949			3,383	3,273	1,479
1950			3,904	3,692	1,583
1951			5,279	4,611	1,616
1952			5,014	4,211	1,643
1953			5,680	4,655	1,484
1954			6,250	5,073	1,420
1955			7,611	6,007	1,344
1956			8,817	6,594	1,252
1957			9,556	6,805	1,249
1958			8,675	6,065	1,173
1959			8,824	5,998	1,258

TABLE A-1 (continued)

PART F. TRANSPORTATION AND OTHER PUBLIC UTILITIES CONSTRUCTION

Year	Series 27: Rail Consumption (thousand long tons)	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.[b]	Series 29: All Telephone Systems (thousand miles)	Series 30: 1929 Prices (million dollars)	Series 31: Current Prices (million dollars)	Series 32: 1947-49 Prices (million dollars)	Series 33: Current Prices (million dollars)
1853							
1854							
1855	261						
1856	328						
1857	337						
1858	228						
1859	249						
1860	314						
1861	247						
1862	200						
1863	264						
1864	427						
1865	.375						
1866	490						
1867	558		9.60				
1868	676		12.30				
1869	810		6.99				

TABLE A-1 (continued)

PART F (continued)

Year	Series 27: Rail Consumption (thousand long tons)	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.[b] (thousand miles)	Series 29: All Telephone Systems	Series 30: 1929 Prices (million dollars)	Series 31: Current Prices	Series 32: 1947-49 Prices (million dollars)	Series 33: Current Prices
1870	910	7.61		888	452		
1871	1,198	8.96		996	506		
1872	1,366	16.04		837	457		
1873	1,025	17.28		572	320		
1874	747	21.26		353	186		
1875	724	3.76		270	135		
1876	782	4.34		284	133		
1877	676	10.49		343	147		
1878	780	11.88		357	143		
1879	1,030	5.36		399	159		
1880	1,564	21.97		765	339		
1881	1,991	93.64	22	1,138	511		
1882	1,705	47.20	31	1,009	470		
1883	1,247	58.36	32	735	335		
1884	1,019	17.84	22	546	241		
1885	971	11.71	19	440	191		
1886	1,639	27.32	16	580	253		
1887	2,277	35.03	31	815	353		
1888	1,460	91.61	41	761	328		
1889	1,519	31.45	36	743	318		

(continued)

TABLE A-1 (continued)

PART F (continued)

Year	Series 27: Rail Consumption (thousand long tons)	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.[b] (thousand miles)	Series 29: All Telephone Systems	Series 30: 1929 Prices (million dollars)	Series 31: Current Prices	Series 32: 1947-49 Prices (million dollars)	Series 33: Current Prices
1890	1,869	31.30	52	788	338		
1891	1,296	36.59	50	840	351		
1892	1,544	23.51	59	1,384	566		
1893	1,119	30.10	67	1,498	608		
1894	1,009	21.59	92	916	361		
1895	1,292	11.86	122	625	242		
1896	1,057	24.28	161	592	229		
1897	1,500	14.07	222	642	249		
1898	1,680	33.42	339	776	312		
1899	1,997	30.21	595	1,023	448		
1900	2,026	28.52	768	1,088	496		
1901	2,558	39.61	778	1,104	497		
1902	2,944	57.22	1,315	1,186	548		
1903	3,057	59.23	951	1,272	598		
1904	1,906	66.19	1,078	1,395	661		
1905	3,098	29.15	1,541	1,627	799		
1906	3,655	71.59	2,087	1,952	1,027		
1907	3,298	65.05	2,442	2,114	1,154		
1908	1,726	38.23	1,495	2,034	1,078		
1909	2,726	23.07	919	2,060	1,131		

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TABLE A-1 (continued)

PART F (continued)

Year	Series 27: Rail Consumption (thousand long tons)	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.[b] (thousand miles)	Series 29: All Telephone Systems	Series 30: 1929 Prices (million dollars)	Series 31: Current Prices (million dollars)	Series 32: 1947-49 Prices (million dollars)	Series 33: Current Prices (million dollars)
1910	3,291	46.55	1,524	2,389	1,352		
1911	2,405	58.30	1,391	2,299	1,313		
1912	2,885	44.82[b]	1,920	2,305	1,337		
1913	3,053	26.02[b]	1,994	2,140	1,282		
1914	1,793	47.18[b]	1,480	1,732	1,008		
1915	1,891	1.36	1,070	1,244	735	1,538	549
1916	2,340	16.63	1,308	1,333	912	1,632	658
1917	2,441	-0.38	2,727	1,762	1,471	1,563	788
1918	2,096	-244.42	1,053	1,164	1,171	1,181	697
1919	1,568	51.43	533	1,048	1,139	1,083	673
1920	2,055	15.73	1,587	1,368	1,726	1,110	771
1921	1,879	71.38	2,000	1,335	1,439	969	604
1922	1,921	12.92	3,266	1,746	1,697	1,431	787
1923	2,667	23.39	4,134	2,642	2,740	2,019	1,191
1924	2,268	36.56	5,100	2,754	2,850	2,281	1,356
1925	2,670	41.27	5,700	2,535	2,578	2,234	1,302
1926	3,085	33.06	5,760	2,703	2,700	2,443	1,415
1927	2,644	114.85	5,876	2,655	2,650	2,539	1,450
1928	2,471	106.49	5,294	2,561	2,523	2,395	1,372
1929	2,582	44.39	7,330	2,999	2,999	2,687	1,578

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TABLE A-1 (continued)

PART F (continued)

Year	Series 27: Rail Consumption (thousand long tons)	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.b (thousand miles)	Series 29: All Telephone Systems	Series 30: 1929 Prices (million dollars)	Series 31: Current Prices	Series 32: 1947-49 Prices (million dollars)	Series 33: Current Prices
1930	1,786	14.92	6,650	2,942	2,851	2,742	1,527
1931	1,130	-35.45	2,990	1,782	1,670	1,805	946
1932	397	-14.31	1,578	966	840	976	467
1933	381	3.15	-678	618	533	546	261
1934	944	0.47	-200	801	732	645	326
1935	666	3.06	400	922	857	709	363
1936	1,154	3.06	900	1,369	1,280	988	518
1937	1,306	4.54	2,731	1,859	1,842	1,247	705
1938	544	1.05	2,019	1,281	1,289	1,077	605
1939	1,121	-1.20	2,300	1,328	1,331	1,221	683
1940	1,243	1.32	4,100	1,920	1,933	1,353	771
1941	1,577	14.15	6,300	2,135	2,297	1,436	872
1942		12.64	2,750	1,796	2,058	1,207	786
1943			-300	1,101	1,312	836	570
1944			1,000	1,375	1,646	1,066	725
1945			1,700	1,609	1,976	1,177	827
1946			5,900	2,339	3,233	1,731	1,374
1947			8,900	3,385	5,362	2,496	2,338
1948			12,100	4,062	6,869	2,966	3,043
1949			9,700	3,697	6,537	3,151	3,323

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Year	Series 27: Rail Consumption (thousand long tons)	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.[b] (thousand miles)	Series 29: All Telephone Systems	Series 30: 1929 Prices (million dollars)	Series 31: Current Prices	Series 32: 1947-49 Prices (million dollars)	Series 33: Current Prices
1950			9,400	3,509	6,488	3,001	3,330
1951			8,400			3,056	3,729
1952			10,900			3,225	4,043
1953			12,200			3,408	4,475
1954			13,300			3,170	4,289
1955			16,600			3,119	4,363
1956			20,500			3,230	4,893
1957			29,300			3,384	5,414
1958						3,081	5,087
1959						2,949	4,990

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	PART G. SHIPBUILDING		PART H. PUBLIC CONSTRUCTION	
	Series 34: Tonnage of Merchant Vessels Built in U. S. ᵉ (thousand long	Series 35: Long's Index of Value of Public Build- ing Permits	New Public Construction, Commerce-Labor	
			Series 36: Current Prices	Series 37: 1947-49 Prices
Year	tons)	(1920-30=100)	(million dollars)	
1853	.			
1854				
1855	583			
1856	469			
1857	379			
1858	245			
1859	157			
1860	215			
1861	233			
1862	175			
1863	311			
1864	416			
1865	395			
1866	336			
1867	306			
1868	285	9		
1869	275	9		
1870	277	20		
1871	273	19		
1872	209	6		
1873	359	8		
1874	433	4		
1875	298	4		
1876	204	5		
1877	177	2		
1878	236	2		
1879	193	4		
1880	157	3		
1881	280	2		
1882	282	4		
1883	265	4		
1884	226	5		
1885	159	2		
1886	95	9		
1887	150	13		
1888	218	8		
1889	231	8		
1890	294	14		
1891	369	9		
1892	200	11		
1893	212	23		
1894	131	9		
1895	112	10		
1896	227	9		
1897	232	24		
1898	180	8		
1899	300	12		

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PART G (continued)   PART H (continued)

Year	Series 34: Tonnage of Merchant Vessels Built in U. S.[c] (thousand long tons)	Series 35: Long's Index of Value of Public Building Permits (1920–30=100)	New Public Construction, Commerce–Labor	
			Series 36: Current Prices	Series 37: 1947–49 Prices
			(million dollars)	
1900	394	13		
1901	483	12		
1902	469	16		
1903	436	27		
1904	379	30		
1905	330	24		
1906	419	22		
1907	471	25		
1908	614	22		
1909	238	16		
1910	342	23		
1911	291	29		
1912	233	28		
1913	346	27		
1914	316	22		
1915	225	29	719	2,407
1916	325	19	708	2,040
1917	664	27	1,279	3,062
1918	1,301	9	2,238	4,699
1919	3,327	16	1,976	3,519
1920	3,881	28	1,352	1,769
1921	2,265	39	1,564	2,512
1922	661	86	1,684	2,993
1923	336	95	1,622	2,605
1924	234	92	1,901	3,071
1925	200	88	2,138	3,591
1926	225	101	2,144	3,682
1927	245	140	2,409	4,132
1928	257	124	2,485	4,379
1929	129	161	2,486	4,440
1930	254	140	2,858	5,393
1931	387	100	2,659	5,550
1932	213	88	1,862	4,623
1933	191	14	1,648	3,408
1934	67	26	2,211	4,121
1935	63	68	2,233	4,240
1936	224		3,516	6,495
1937	471		3,096	5,420
1938	237[c]		3,420	6,091
1939	340[c]		3,809	7,032
1940	447[c]		3,628	6,643
1941	647		5,751	10,191
1942	4,544		10,660	16,993
1943	10,432		6,322	9,630
1944	8,032		3,073	4,815
1945	6,314		2,398	3,647
1946	548		2,231	2,819
1947	267		3,319	3,551
1948	200		4,704	4,495
1949	195		6,269	6,089

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PART G (concluded)   PART H (concluded)

Year	Series 34: Tonnage of Merchant Vessels Built in U. S.[c] (thousand long tons)	Series 35: Long's Index of Value of Public Building Permits (1920-30=100)	New Public Construction, Commerce-Labor	
			Series 36: Current Prices (million dollars)	Series 37: 1947-49 Prices
1950			6,866	6,576
1951			9,253	8,157
1952			10,781	9,131
1953			11,236	9,371
1954			11,678	9,865
1955			11,724	9,673
1956			12,712	9,876
1957			14,017	10,475
1958			15,457	11,440
1959			16,107	11,769

Source: See Appendix A, Part II.

[a]Kuznets' series prior to 1889 are published only as five-year moving averages.

[b]1867-1913: fiscal years ending June 30; 1914-42: calendar years; fiscal years 1914 and 1915 are 27,580 and 24,270, respectively.

[c]1855-1939: fiscal years ending June 30; 1940-57: calendar years; fiscal year 1940 is 193,229 long tons.

TABLE A-2

AVERAGE REFERENCE-CYCLE STANDINGS FOR THIRTY-EIGHT CONSTRUCTION SERIES
(combined trough-to-trough and peak-to-peak standings)

PART A. AGGREGATE CONSTRUCTION
(dollars in millions)

Mid-point of Cycle[a]	Gross New Construction, Kuznets		INDEX OF VALUE OF CONSTRUCTION, NBER				Series 5: Index of Physical Volume of Construction, NBER		Series 6: Total Construction (Commerce-Labor, current prices)	Series 7: New Construction (Commerce-Labor, current prices)	Series 8: New Construction (Commerce-Labor, 1947-49 prices)
	Series 1: Current Prices	Series 2: 1929 Prices	Series 3: Current Prices		Series 4: Constant Prices						
			Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Seg. I (1856-97 = 100)	Seg. II (1889-1918 = 100)			
1854.5											
1856.5											
1858							55.2				
1859.5							54.4				
1862							58.5				
1864							70.7				
1866.5							96.7				
1868.5							127.2				
1871	756	1,478					148.9				
1874	827	1,720	82.6		73.9		110.6				
1877.5	914	2,033	61.0		59.5		83.7				
1881.5	1,153	2,581	80.0		79.6		87.4				
1884.5	1,450	3,211	100.3		99.3		110.0				
1886.5	1,616	3,646	113.6		114.5		136.6				
1888.5	1,768	4,046	130.4		131.9		146.6				
1889.5	1,981	4,524	135.5		138.1		144.0				
1891	2,348	5,522	140.3	68.4	147.0	82.7	134.0	83.0			
1892.5	2,342	5,692	133.9	71.3	145.0	89.4	119.5	77.3			
1893.5	2,246	5,574	120.5	68.0	132.9	86.6	112.6	73.1			
1895	2,088	5,310	100.8	60.6	113.9	78.3	111.3	71.6			

(continued)

TABLE A-2 (continued)

PART A (continued)

| | Gross New Construction, Kuznets | | INDEX OF VALUE OF CONSTRUCTION, NBER | | | | Series 5: Index of Physical Volume of Construction, NBER | | Series 6: | Series 7: | Series 8: |
| | | | Series 3: Current Prices | | Series 4: Constant Prices | | | | Total Construction | New Construction | New Construction |
Mid-point of Cycle[a]	Series 1: Current Prices	Series 2: 1929 Prices	Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Seg. I (1856-97 = 100)	Seg. II (1889-1918 = 100)	(Commerce-Labor, current prices)	(Commerce-Labor, current prices)	(Commerce-Labor, 1947-49 prices)
1897	2,019	5,147		59.4		76.2		71.8			
1898	2,078	5,158		60.0		75.0		71.4			
1901	2,712	6,129		72.6		83.0		79.7			
1902	2,906	6,483		78.2		88.0		84.9			
1905	3,501	7,137		113.4		115.9		118.3			
1906	3,769	7,423		124.5		123.3		124.6			
1908.5	4,249	8,036		138.2		130.2		120.7			
1909.5	4,303	8,097		144.8		134.8		124.2			
1911.5	4,466	8,171		153.0		138.6		129.0			
1912.5	4,478	8,116		149.5		134.3		128.9			
1915.5	4,206	6,643		131.8		104.8		122.5			
1916.5	4,493	6,282									
1919	6,161	5,922							8,702	6,115	11,482
1920	6,552	5,867							9,296	6,450	11,210
1921.5	7,535	7,548							10,203	7,230	14,020
1922.5	8,774	8,989							11,492	8,395	16,664
1924.5	11,282	11,344							14,315	10,851	21,148
1925.5	12,030	12,188							15,226	11,580	22,733
1927.5	12,107	12,317							15,664	11,704	23,042
1929.5	9,388	9,808							12,785	9,078	18,329

(continued)

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TABLE A-2 (continued)

PART A (concluded)

| Mid-point of Cycle[a] | Gross New Construction, Kuznets | | INDEX OF VALUE OF CONSTRUCTION, NBER | | | | Series 5: Index of Physical Volume of Construction, NBER | | Series 6: Total Construction (Commerce-Labor, current prices) | Series 7: New Construction (Commerce-Labor, current prices) | Series 8: New Construction (Commerce-Labor, 1947-49 prices) |
| | Series 1: Current Prices | Series 2: 1929 Prices | Series 3: Current Prices | | Series 4: Constant Prices | | | | | | |
			Seg. I (1870-97 =100)	Seg. II (1889-1918 =100)	Seg. I (1870-97 =100)	Seg. II (1889-1918 =100)	Seg. I (1856-97 =100)	Seg. II (1889-1918 =100)			
1933	5,885	6,404							8,878	5,616	11,809
1935	5,231	5,644							8,178	4,931	10,290
1940.5	9,582	8,840							13,570	9,189	16,373
1942	9,447	8,262							13,956	9,011	15,250
1946	13,351	8,110							20,920	12,647	14,828
1947.5	20,745	11,054							30,579	19,850	20,425
1950.5	31,716	14,661							43,262	30,326	27,035
1951.5	34,691	15,610							46,685	33,222	28,731
1955	45,149	18,501							58,837	42,928	33,767
1956	47,866	19,029							62,206	45,474	34,713

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TABLE A-2 (continued)

PART B. TOTAL URBAN BUILDING

Mid-point of Cycle[a]	Rigglesman's Value of Building Permits Per Capita		Series 11: Series 9 as Adjusted by Isard (1920-29=100)	Long's Index of All Permits		Series 14: Series 12 as Adjusted by Colean and Newcomb (1920-29=100)	Colean-Newcomb Index of Value of New Building	
	Series 9: Current Prices (dollars)	Series 10: 1913 Prices as Percentage of Trend		Series 12: Value (1920-30=100)	Series 13: Number (1920-30=100)		Series 15: Current Prices (1920-29=100)	Series 16: Constant Prices (1913=100)
1854.5	23.07	137.7	6.07				5.9	31.6
1856.5	19.24	113.5	6.04				5.2	31.7
1858	15.75	92.4	5.28		20.5		4.6	27.7
1859.5	13.54	67.4	4.57		22.3		4.3	24.1
1862			4.24		24.6			19.3
1864	17.13	66.0	5.79		24.8		6.0	20.6
1866.5	26.29	85.8	9.64		35.2		9.6	28.4
1868.5	34.53	112.2	13.43		48.7		13.2	39.0
1871	33.40	112.9	13.73	9.8	54.1	8.4	13.4	41.3
1874	23.76	87.8	8.85	6.8	38.3	5.8	8.8	29.4
1877.5	17.50	73.5	6.02	6.5	23.7	5.5	6.8	26.0
1881.5	19.77	86.2	7.76	9.7	21.1	8.1	8.8	35.1
1884.5	26.04	111.3	11.33	13.1	29.6	10.5	11.5	45.2
1886.5	28.61	122.6	13.45	15.5	34.2	12.3	13.3	52.7
1888.5	31.04	135.3	15.72	17.7	33.3	14.5	15.5	62.4
1889.5	32.33	143.5	16.65	18.5	33.3	15.5	16.3	67.1
1891	31.44	143.8	16.66	17.8	32.2	15.5	16.8	71.0
1892.5	26.03	120.3	14.52	16.3	29.3	14.8	16.2	69.3
1893.5	23.42	108.8	13.52	16.3	27.0	15.0	16.2	69.8
1895	22.62	106.4	13.68	17.8	25.8	16.5	17.0	74.4

(continued)

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TABLE A-2 (continued)
PART B (concluded)

Midpoint of Cycle[a]	Riggleman's Value of Building Permits Per Capita		Series 11: Series 9 as Adjusted by Isard (1920-29=100)	Long's Index of All Permits		Series 14: Series 12 as Adjusted by Colean and Newcomb (1920-29=100)	Colean-Newcomb Index of Value of New Building	
	Series 9: Current Prices (dollars)	Series 10: 1913 Prices as Percentage of Trend		Series 12: Value (1920-30=100)	Series 13: Number		Series 15: Current Prices (1920-29=100)	Series 16: Constant Prices (1913=100)
1897	21.03	99.7	13.30	17.8	24.1	16.1	16.8	74.1
1898	20.42	94.3	13.14	17.5	22.8	15.6	16.5	71.1
1901	23.07	91.5	16.00	18.4	21.5	18.1	19.1	70.8
1902	24.73	95.4	17.72	19.4	23.0	19.5	20.9	75.4
1905	34.24	120.6	26.91	29.4	35.4	26.6	27.8	91.9
1906	35.80	122.2	28.87	30.5	38.2	27.5	29.0	93.0
1908.5	35.94	121.6	31.30	30.3	41.8	28.3	30.5	97.0
1909.5	36.97	126.6	33.09	32.8	44.5	31.3	33.0	106.2
1911.5	35.90	122.7	33.74	33.7	45.5	34.2	35.7	115.1
1912.5	34.11	115.0	32.76	32.0	44.3	32.3	34.2	108.8
1915.5	28.19	81.0	28.83	27.7	44.2	28.0	38.3	97.9
1916.5	27.40	69.6	28.70	27.7	42.7	28.6	43.6	97.0
1919	34.42	50.3	38.34	37.3	58.8	41.0	62.2	89.4
1920	44.87	63.2	50.88	49.5	66.0	53.5	65.8	87.3
1921.5	66.58	107.6	78.12	77.8	96.2	73.5	73.7	112.0
1922.5	81.96	131.0	97.95	99.3	118.3	90.2	85.5	130.1
1924.5	99.86	150.1	124.10	130.5	137.8	120.7	110.7	159.2
1925.5	99.80	151.6	126.29	133.8	130.8	125.5	118.2	171.9
1927.5	85.43	130.5	111.85	117.0	96.2	113.7	119.5	175.1
1929.5	54.82	85.7	73.46	74.6	61.6	77.0	92.5	140.4
1933							57.1	
1935							50.1	
1940.5							93.6	
1942							91.2	
1946							121.6	
1947.5							189.3	

(continued)

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PART C. NONFARM RESIDENTIAL BUILDING

Mid-point of Cycle[a]	Long's Index of Residential Permits		Expenditures for New Dwelling Units, Blank		Series 21: Number of Dwelling Units Started, Blank (thousands)	Series 21a: Production of Housekeeping Dwelling Units, Gottlieb (thousands)
	Series 17: Value	Series 18: Number	Series 19: Current Prices	Series 20: 1929 Prices		
	(1920-30=100)		(million dollars)			
1854.5						136.7
1856.5						132.5
1858		22.4				113.9
1859.5		25.2				91.8
1862		27.0				72.9
1864		27.5				88.8
1866.5		38.8				130.1
1868.5		58.7				161.2
1871	13.9	65.5				160.8
1874	9.6	49.0				138.2
1877.5	9.8	32.4				131.5
1881.5	15.1	31.1				185.8
1884.5	20.3	47.8				266.6
1886.5	23.0	60.3				306.7
1888.5	22.0	67.3				323.2
1889.5	22.0	67.5				304.2
1891	20.3	61.8	694	1,830	326	276.2
1892.5	18.0	55.3	650	1,770	310	262.5
1893.5	18.0	52.2	633	1,759	292	247.8
1895	19.8	51.8	640	1,824	285	241.8
1897	19.8	46.8	617	1,739	277	234.4
1898	19.5	41.9	586	1,611	265	233.0
1901	16.6	33.5	556	1,365	243	293.2
1902	17.1	35.8	588	1,414	255	328.4
1905	32.4	59.1	959	2,083	413	467.8
1906	33.8	64.3	1,056	2,218	448	490.6
1908.5	32.2	69.2	1,113	2,182	439	503.7
1909.5	34.0	72.2	1,106	2,135	428	505.7
1911.5	31.0	67.7	1,060	2,002	408	484.3
1912.5	29.5	64.0	1,087	2,064	418	483.5
1915.5	25.6	54.0	1,009	1,794	360	402.6
1916.5	24.5	49.8	955	1,560	319	366.8
1919	27.3	45.3	995	1,032	241	311.2
1920	38.3	53.5	1,299	1,264	300	351.0
1921.5	81.2	96.0	2,422	2,572	570	619.3
1922.5	110.0	126.0	3,367	3,566	753	814.7
1924.5	140.5	150.3	4,642	4,792	897	997.0
1925.5	141.0	140.7	4,796	4,972	879	986.0
1927.5	115.5	93.8	4,238	4,394	747	789.8
1929.5	64.9	51.9	2,520	2,637	464	540.9
1933			1,028	1,148	235	342.8
1935			853	982	223	339.7
1940.5			1,809	1,732	390	
1942			1,721	1,535	371	
1946			3,376	1,876	561	
1947.5			6,076	3,092	862	
1950.5			9,506	4,250	1,084	
1951.5			10,292	4,476	1,121	
1955			13,045	5,218	1,159	
1956			13,488	5,281	1,142	

(continued)

	PART D. PRIVATE NONRESIDENTIAL BUILDING				PART E. FARM CONSTRUCTION

Mid-point of Cycle[a]	Long's Index of Nonresidential Permits		New Private Nonresidential Construction, Commerce-Labor		Series 26: New Farm Construction, Commerce-Labor, 1947–49 Prices (million dollars)
	Series 22: Value (1920-30=100)	Series 23: Number (1920-30=100)	Series 24: Current Prices (million dollars)	Series 25: 1947–49 Prices (million dollars)	
1854.5					
1856.5					
1858		14.5			
1859.5		12.0			
1862		13.3			
1864		19.5			
1866.5		24.8			
1868.5		26.0			
1871	5.5	28.8			
1874	3.6	19.1			
1877.5	3.1	11.4			
1881.5	4.3	10.0			
1884.5	5.5	11.4			
1886.5	7.2	13.3			
1888.5	11.7	15.0			
1889.5	13.5	14.8			
1891	14.8	14.3			
1892.5	14.7	13.7			
1893.5	14.7	13.2			
1895	16.0	13.0			
1897	15.3	11.5			
1898	14.5	10.8			
1901	20.4	12.4			
1902	22.5	14.0			
1905	25.6	19.1			
1906	26.1	20.0			
1908.5	27.8	21.2			
1909.5	31.3	24.0			
1911.5	37.2	28.8			
1912.5	35.3	28.7			
1915.5	30.5	34.0			
1916.5	31.9	38.5			
1919	50.3	61.8	1,215	2,390	1,042
1920	64.3	75.8	1,611	2,957	858
1921.5	73.7	94.7	1,574	3,268	614
1922.5	85.2	110.0	1,570	3,374	592
1924.5	117.3	126.2	1,947	4,059	618
1925.5	124.7	122.5	2,226	4,664	626
1927.5	118.8	100.0	2,570	5,410	666
1929.5	87.4	70.5	1,977	4,346	471
1933			943	2,274	290
1935			628	1,574	292
1940.5			806	1,669	510
1942			949	1,728	533
1946			2,421	2,934	972
1947.5			3,460	3,662	1,411
1950.5			4,460	3,984	1,561
1951.5			4,939	4,268	1,555
1955			7,574	5,851	1,346
1956			8,362	6,243	1,285

(continued)

PART F. TRANSPORTATION AND OTHER PUBLIC UTILITIES CONSTRUCTION

Mid-point of Cycle[a]	Series 27: Rail Consumption (thousand long tons)	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.[b] (thousand miles)	Series 29: All Telephone Systems	Series 30: 1929 Prices (million dollars)	Series 31: Current Prices (million dollars)	Series 32: 1947-49 Prices (million dollars)	Series 33: Current Prices (million dollars)
1854.5	303						
1856.5	284						
1858	267						
1859.5	271						
1862	360						
1864	544						
1866.5	740	8.41					
1868.5		11.19					
1871	1,098	11.94					
1874	920	22.77		535	273		
1877.5	1,073	36.60		522	239		
1881.5	1,347	31.27		713	317		
1884.5	1,373	38.00	24	643	286		
1886.5	1,710	52.08	26	665	288		
1888.5	1,684	42.28	40	768	330		
1889.5	1,589	30.27	44	777	332		
1891	1,501	27.57	53	963	402		
1892.5	1,272	20.21	66	1,253	510		
1893.5	1,182	17.99	83	1,140	458		
1895	1,162		124	690	268		

(continued)

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TABLE A-2 (continued)

PART F (continued)

Midpoint of Cycle[a]	Series 27: Rail Consumption (thousand long tons)	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.[b] (thousand miles)	Series 29: All Telephone Systems	Series 30: 1929 Prices (million dollars)	Series 31: Current Prices	Series 32: 1947–49 Prices (million dollars)	Series 33: Current Prices
1897	1,470	26.02	270	708	284		
1898	1,680	29.75	405	820	343		
1901	2,514	46.90	908	1,131	516		
1902	2,631	56.45	992	1,201	555		
1905	2,959	57.27	1,601	1,667	841		
1906	2,967	54.50	1,839	1,852	962		
1908.5	2,582	39.03	1,466	2,115	1,154		
1909.5	2,694	39.30	1,295	2,205	1,226		
1911.5	2,821	46.47	1,690	2,290	1,322		
1912.5	2,679	34.93	1,783	2,154	1,260		
1915.5	2,208	b	1,622	1,545	1,070		
1916.5	2,090	−35.50	1,433	1,379	1,072		
1919	1,822	−31.46	926	1,157	1,294	1,114	704
1920	1,889	38.57	1,427	1,280	1,508	1,068	705
1921.5	2,054	34.62	2,709	1,695	1,790	1,322	791
1922.5	2,220	30.09	3,650	2,144	2,194	1,692	986
1924.5	2,605	35.35	5,249	2,654	2,716	2,249	1,320
1925.5	2,737	50.01	5,649	2,648	2,676	2,362	1,373
1927.5	2,650	86.69	5,905	2,689	2,674	2,500	1,440
1929.5	1,898	36.12	5,198	2,419	2,358	2,277	1,276

(continued)

TABLE A-2 (continued)

PART F (concluded)

Mid-point of Cycle[a]	Series 27: Rail Consumption (thousand long tons)	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.[b] (thousand miles)	Series 29: All Telephone Systems	Series 30: 1929 Prices (million dollars)	Series 31: Current Prices	Series 32: 1947-49 Prices (million dollars)	Series 33: Current Prices
1933	1,050	-0.08	2,084	1,479	1,398	1,297	694
1935	820	1.28	825	1,115	1,051	860	452
1940.5			2,719	1,597	1,709	1,184	715
1942			2,726	1,634	1,852	1,212	778
1946			5,875	2,513	3,707	1,855	1,606
1947.5			9,600	3,488	5,705	2,634	2,576
1950.5			8,900			3,124	3,637
1951.5			10,480			3,170	3,877
1955			17,788			3,229	4,622
1956						3,215	4,840

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	PART G. SHIPBUILDING		PART H. PUBLIC CONSTRUCTION	

			New Public Construction, Commerce-Labor	
Mid-point of Cycle[a]	Series 34: Tonnage of Merchant Vessels Built in U. S. (thousand long tons)	Series 35: Long's Index of Value of Public Build-ing Permits (1920-30=100)	Series 36: Current Prices	Series 37: 1947-49 Prices
			(million dollars)	
1854.5				
1856.5	421			
1858	281			
1859.5	203			
1862	259			
1864	317			
1866.5	333			
1868.5	284			
1871	269	13.4		
1874	276	7.4		
1877.5	255	3.6		
1881.5	229	3.4		
1884.5	192	5.7		
1886.5	145	9.0		
1888.5	224	9.8		
1889.5	273	10.2		
1891	308	10.8		
1892.5	221	14.3		
1893.5	166	14.2		
1895	145	9.5		
1897	211	13.0		
1898	256	13.8		
1901	429	15.1		
1902	444	19.1		
1905	395	25.5		
1906	429	24.2		
1908.5	420	20.7		
1909.5	344	21.5		
1911.5	289	27.3		
1912.5	294	26.8		
1915.5	471	23.0		
1916.5	867	20.6		
1919	2,959	17.2	1,886	3,376
1920	3,338	27.8	1,561	2,392
1921.5	1,678	62.2	1,578	2,564
1922.5	747	82.2	1,680	2,796
1924.5	235	92.7	1,974	3,268
1925.5	220	101.7	2,146	3,625
1927.5	226	131.7	2,403	4,191
1929.5	251	127.8	2,525	4,828
1933	212		2,472	4,845
1935	207		2,558	4,840
1940.5	2,986		5,239	8,814
1942	3,894		4,808	7,926
1946	2,811		2,959	3,668
1947.5	280		4,091	4,167
1950.5			8,228	7,377
1951.5			9,422	8,242
1955			12,185	9,834
1956			13,005	10,169

[a]The peaks and troughs of the successive reference cycles follow:

Calendar Year			Calendar Year	
Peak	Trough		Peak	Trough
1853	1855		1907	1908
1856	1858		1910	1911
1860	1861		1913	1914
1864	1867		1918	1919
1869	1870		1920	1921
1873	1878		1923	1924
1882	1885		1926	1927
1887	1888		1929	1932
1890	1891		1937	1938
1892	1894		1944	1946
1895	1896		1948	1949
1899	1900		1953	1954
1903	1904		1957	1958

The midpoint of the peak-to-peak cycle, 1853-1856, is December 31, 1954 and is shown as 1854.5; the midpoint of the peak-to-peak cycle, 1856-1860, is June 30, 1858 and is shown simply as 1858; etc.

[b]1867-1913, as shown in Table A-1, are fiscal-year data. For reference-cycle dates on a fiscal-year basis see Business Cycle Indicators, Geoffrey H. Moore, ed., Princeton University Press for NBER, Vol. I, Appendix A, Table A.1, p. 670. Because of the break in continuity of the data between 1913 and 1914, it was not possible to compute a reference-cycle standing for the cycle centered at 1915.5.

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RATES OF CHANGE PER ANNUM BETWEEN AVERAGE REFERENCE-CYCLE STANDINGS FOR 38 CONSTRUCTION SERIES
(combined trough-to-trough and peak-to-peak rates in percentages)

PART A. AGGREGATE CONSTRUCTION

| Mid-point[a] | Gross New Construction, Kuznets | | INDEX OF VALUE OF CONSTRUCTION, NBER | | | | Series 5: Index of Physical Volume of Construction, NBER | | Series 6: Total Construction (Commerce-Labor, current prices) | Series 7: New Construction (Commerce-Labor, current prices) | Series 8: New Construction (Commerce-Labor, 1947-49 prices) |
| | | | Series 3: Current Prices | | Series 4: Constant Prices | | | | | | |
	Series 1: Current Prices	Series 2: 1929 Prices	Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Seg. I (1856-97 = 100)	Seg. II (1889-1918 = 100)			
1856.25											
1858							1.44				
1860							5.76				
1861.75							10.92				
1864.25							12.70				
1866.25							9.45				
1868.75							-2.55				
1871.25							-8.62				
1874.25	2.93	4.86					-3.12				
1877.75	4.39	5.34	-0.43		1.00						
1881	6.48	6.42	6.97		7.16		3.87				
1884	6.69	6.84	6.94		7.19		8.79				
1886.5	5.19	5.75	6.51		7.06		7.15				
1888	6.77	7.17	5.88		6.21		1.76				
1889.75	10.87	12.34	2.94		4.34		-3.59				
1891	5.57	7.62	-0.40		1.63		-6.22				
1892.25	-1.78	0.38	-6.08	-0.26	-4.03	1.84	-6.96	-5.08			
1893.75	-4.58	-2.78	-11.29	-6.50	-9.62	-5.28	-2.82	-3.06			
1895.25	-3.04	-2.28		-3.83		-3.66		-0.52			
1896.5	-0.16	-0.97		-0.33		-1.47		-0.12			
1899	7.33	4.36		5.00		2.14		2.59			

(continued)

TABLE A-3 (continued)
PART A (concluded)

Mid-point[a]	Gross New Construction, Kuznets		INDEX OF VALUE OF CONSTRUCTION, NBER				Series 5: Index of Physical Volume of Construction, NBER		Series 6: Total Construction (Commerce-Labor, current prices)	Series 7: New Construction (Commerce-Labor, current prices)	Series 8: New Construction (Commerce-Labor, 1947-49 prices)
	Series 1: Current Prices	Series 2: 1929 Prices	Series 3: Current Prices		Series 4: Constant Prices						
			Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Seg. I (1870-97 = 100)	Seg. II (1889-1918 = 100)	Seg. I (1856-97 = 100)	Seg. II (1889-1918 = 100)			
1900	8.30	5.69		6.60		4.01		4.32			
1903	6.35	3.80		10.96		8.27		9.76			
1904	6.47	3.38		11.42		8.35		9.47			
1906.75	5.52	3.39		5.63		3.33		0.57			
1907.75	3.78	2.48		4.30		2.53		-0.10			
1910	1.65	0.56		3.38		2.09		2.22			
1911	1.33	0.08		1.06		0.12		1.24			
1913.5	-1.50	-5.16		-3.73		-6.94		-1.30			
1914.5	0.08	-6.37									
1917.25	10.78	-3.27									
1918.25	10.65	-1.95									
1920.25	8.02	9.65							6.35	6.69	7.96
1921.25	11.60	16.81							8.45	10.48	15.65
1923	13.28	13.40							11.18	13.35	13.51
1924	10.43	10.07							9.32	10.63	10.27
1926	2.35	2.74							3.00	2.52	2.86
1927.5	-6.17	-5.41							-4.36	-6.06	-5.36
1930.25	-12.57	-11.49							-10.06	-12.78	-11.72
1932.25	-10.34	-9.80							-7.99	-10.76	-10.21
1936.75	6.37	4.26							5.57	6.43	4.32
1938.5	8.21	5.38							7.46	8.36	5.55
1943.25	5.98	-1.57							7.75	5.76	-1.80
1944.75	13.61	5.26							13.57	13.66	5.27
1948.25	18.11	12.79							15.47	18.28	12.96
1949.5	12.58	8.54							10.42	12.60	8.45
1952.75	7.77	5.15							6.78	7.65	4.92
1953.75	7.09	4.39							6.33	6.92	4.19

(continued)

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TABLE A-3 (continued)

PART B. TOTAL URBAN BUILDING

Mid-point[a]	Riggleman's Value of Building Permits Per Capita		Series 11: Series 9 as Adjusted by Isard (1920-29=100)	Long's Index of All Permits		Series 14: Series 12 as Adjusted by Colean and Newcomb (1920-29=100)	Colean-Newcomb Index of Value of New Building	
	Series 9: Current Prices (dollars)	Series 10: 1913 Prices as Percentage of Trend		Series 12: Value (1920-30=100)	Series 13: Number (1920-30=100)		Series 15: Current Prices (1920-29=100)	Series 16: Constant Prices (1913=100)
1856.25	-10.13	-9.45	-3.97				-4.48	-3.81
1858	-12.56	-13.13	-9.20				-8.58	-9.12
1860	-8.71	-12.72	-5.48		4.58		-4.80	-8.95
1861.75	1.86	-7.40	5.22		2.36		5.84	-3.43
1864.25	14.23	5.32	17.30		7.85		17.01	8.55
1866.25	14.98	11.51	17.68		14.42		16.87	13.69
1868.75	5.30	6.06	7.77		9.42		7.35	8.19
1871.25	-6.72	-4.42	-7.47		-4.33		-7.26	-5.10
1874.25	-9.51	-6.50	-12.01	-6.15	-12.02	-6.38	-10.19	-7.01
1877.75	-2.44	-0.25	-1.75	4.77	-7.70	4.46	-0.03	2.35
1881	5.60	5.85	8.74	9.65	3.15	8.93	7.42	7.70
1884	7.31	6.98	10.73	9.23	9.42	8.34	8.18	8.01
1886.5	4.38	4.86	8.11	7.40	2.96	8.00	7.41	8.02
1888	4.07	5.24	7.09	5.88	-0.83	7.64	6.74	8.03
1889.75	0.52	2.45	2.33	0.14	-1.32	2.67	3.10	5.15
1891	-7.20	-5.87	-4.57	-4.19	-4.26	-1.51	-0.33	1.09
1892.25	-11.70	-11.08	-8.31	-3.38	-7.09	-1.31	-1.41	-0.69
1893.75	-5.60	-4.90	-2.37	3.38	-5.20	4.31	2.00	2.83
1895.25	-3.07	-2.51	-0.47	2.41	-3.21	2.07	1.01	1.73
1896.5	-3.42	-4.01	-1.35	-0.47	-4.12	-1.82	-1.00	-1.51
1899	2.31	-2.14	4.60	0.87	-2.88	2.92	3.31	-1.14
1900	4.78	0.28	7.43	2.54	0.27	5.52	5.85	1.47

(continued)

TABLE A-3 (continued)

PART B (concluded)

Mid-point[a]	Riggleman's Value of Building Permits Per Capita		Series 11: Series 9 as Adjusted by Isard (1920-29=100)	Long's Index of All Permits		Series 14: Series 12 as Adjusted by Colean and Newcomb (1920-29=100)	Colean-Newcomb Index of Value of New Building	
	Series 9: Current Prices (dollars)	Series 10: 1913 Prices as Percentage of Trend		Series 12: Value (1920-30=100)	Series 13: Number (1920-30=100)		Series 15: Current Prices (1920-29=100)	Series 16: Constant Prices (1913=100)
1903	9.75	6.86	12.71	11.52	12.20	9.50	9.20	6.48
1904	9.14	6.16	11.96	11.15	12.45	8.51	8.15	5.22
1906.75	1.38	0.24	4.31	0.90	4.77	1.76	2.70	1.54
1907.75	0.92	1.01	3.89	2.09	4.31	3.70	3.69	3.79
1910	-0.04	0.30	2.49	3.52	2.80	6.27	5.21	5.70
1911	-2.68	-3.19	-0.33	-0.84	-0.13	1.05	1.16	0.81
1913.5	-6.01	-10.23	-3.92	-4.89	-0.73	-4.97	1.78	-4.04
1914.5	-5.46	-12.30	-3.31	-3.61	-0.94	-3.03	6.06	-2.87
1917.25	5.69	-13.35	8.09	8.41	8.07	10.77	13.61	-2.59
1918.25	13.81	-2.75	15.93	16.15	12.25	17.31	11.57	-3.02
1920.25	25.47	29.02	27.33	28.20	19.32	22.71	6.72	8.96
1921.25	23.40	27.92	25.30	26.78	22.71	20.43	10.45	15.76
1923	13.33	10.99	15.16	16.86	11.87	16.20	13.38	11.61
1924	6.54	4.86	8.43	9.87	3.34	10.91	10.69	9.22
1926	-5.19	-4.66	-3.46	-3.64	-11.87	-1.99	2.56	3.17
1927.5	-14.55	-13.88	-13.22	-14.20	-17.99	-11.98	-6.09	-5.04
1930.25							-12.86	
1932.25							-10.82	
1936.75							6.47	
1938.5							8.31	
1943.25							4.73	
1944.75							12.72	

(continued)

PART C. NONFARM RESIDENTIAL BUILDING

Mid-point[a]	Long's Index of Residential Permits		Expenditures for New Dwelling Units, Blank		Series 21: Number of Dwelling Units Started, Blank	Series 21a: Production of Housekeeping Dwelling Units, Gottlieb
	Series 17: Value	Series 18: Number	Series 19: Current Prices	Series 20: 1929 Prices		
1856.25						-5.20
1858						-12.09
1860		4.68				-10.98
1861.75		1.95				-0.76
1864.25		7.98				12.53
1866.25		16.08				12.88
1868.75		11.37				4.68
1871.25		-3.27				-2.78
1874.25	-5.37	-10.39				-3.08
1877.75	5.96	-5.97				3.91
1881	10.04	5.47				9.70
1884	8.34	12.80				9.82
1886.5	1.99	8.47				4.80
1888	-1.48	3.75				-0.27
1889.75	-3.31	-3.45				-6.26
1891	-6.67	-6.62				-4.90
1892.25	-4.71	-6.71	-3.71	-1.58	-4.39	-4.34
1893.75	3.71	-2.66	-0.63	1.21	-3.34	-3.29
1895.25	2.65	-3.14	-0.73	-0.32	-1.58	-1.59
1896.5	-0.42	-7.03	-2.90	-4.13	-2.46	-1.23
1899	-4.30	-8.26	-2.60	-6.02	-3.25	5.58
1900	-3.24	-3.95	0.06	-3.25	-0.94	8.50
1903	16.07	13.83	13.32	10.40	12.96	11.46
1904	16.34	14.25	14.24	11.07	13.72	9.90
1906.75	-0.17	4.48	4.24	1.33	1.76	2.11
1907.75	0.21	3.32	1.32	1.09	-1.29	0.86
1910	-1.25	-0.73	-1.61	-2.85	-2.43	-1.30
1911	-4.72	-4.01	-0.56	-1.12	-0.77	-1.49
1913.5	-4.75	-5.62	-1.23	-2.75	-3.14	-4.61
1914.5	-4.63	-6.23	-3.23	-6.96	-6.72	-6.86
1917.25	1.76	-5.04	-0.41	-15.40	-11.29	-7.31
1918.25	12.52	2.04	8.72	-5.99	-1.82	-1.26
1920.25	39.79	28.74	33.42	34.18	32.40	26.48
1921.25	38.72	32.31	35.45	38.14	34.46	31.82
1923	17.84	14.70	20.95	20.10	14.87	15.58
1924	8.23	3.67	11.67	10.98	5.17	6.34
1926	-6.51	-15.43	-3.03	-2.89	-6.06	-7.73
1927.5	-18.49	-23.06	-15.49	-15.34	-15.48	-14.58
1930.25			-22.17	-21.30	-18.98	-14.35
1932.25			-18.02	-16.63	-12.75	-8.31
1936.75			7.34	5.41	6.62	
1938.5			9.64	6.28	7.13	
1943.25			10.99	1.45	6.54	
1944.75			20.31	12.24	14.47	
1948.25			23.79	17.22	14.15	
1949.5			12.88	9.14	6.53	
1952.75			6.98	4.54	1.48	
1953.75			5.97	3.67	0.42	

	PART D. PRIVATE NONRESIDENTIAL BUILDING				PART E. FARM CONSTRUCTION

Mid-point[a]	Long's Index of Nonresidential Permits		New Private Nonresi- dential Construction, Commerce–Labor		Series 26: New Farm Construction, Commerce-Labor, 1947–49 Prices
	Series 22: Value	Series 23: Number	Series 24: Current Prices	Series 25: 1947–49 Prices	
1856.25					
1858					
1860		-2.25			
1861.75		10.58			
1864.25		13.50			
1866.25		6.35			
1868.75		3.27			
1871.25		-5.54			
1874.25	-8.76	-13.32			
1877.75	2.54	-8.35			
1881	8.13	0.00			
1884	10.00	5.68			
1886.5	18.00	6.87			
1888	20.34	3.56			
1889.75	9.27	-2.05			
1891	2.81	-2.63			
1892.25	-0.17	-3.10			
1893.75	3.42	-2.06			
1895.25	1.07	-3.91			
1896.5	-3.28	-6.32			
1899	7.19	1.83			
1900	10.81	6.57			
1903	5.71	10.71			
1904	3.73	8.82			
1906.75	2.34	2.92			
1907.75	5.16	5.19			
1910	9.62	10.03			
1911	4.00	5.93			
1913.5	-4.94	4.24			
1914.5	-2.56	7.30			
1917.25	13.98	16.56			
1918.25	19.25	18.63			
1920.25	15.13	16.84	10.30	12.41	-20.67
1921.25	11.21	14.75	-1.04	5.28	-14.64
1923	15.23	9.51	7.06	7.20	0.20
1924	12.55	3.58	11.53	10.69	1.87
1926	0.42	-7.72	9.20	9.51	2.51
1927.5	-8.80	-13.47	-2.96	-1.76	-7.09
1930.25			-16.85	-14.84	-14.34
1932.25			-18.84	-17.03	-8.56
1936.75			-2.08	-4.09	7.36
1938.5			5.83	1.33	8.38
1943.25			18.20	10.00	11.33
1944.75			20.71	13.05	16.41
1948.25			13.17	6.75	10.33
1949.5			8.80	3.82	2.44
1952.75			11.50	8.35	-3.30
1953.75			11.44	8.35	-4.22

TABLE A-3 (continued)

PART F. TRANSPORTATION AND OTHER PUBLIC UTILITIES CONSTRUCTION

Mid-point[a]	Series 27: Rail Consumption	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.[b]	Series 29: All Telephone Systems	Series 30: 1929 Prices	Series 31: Current Prices	Series 32: 1947-49 Prices	Series 33: Current Prices
1856.25							
1858	-4.26						
1860	-1.21						
1861.75	6.59						
1864.25	14.92						
1866.25	15.37						
1868.75	15.01						
1871.25	3.95	1.01					
1874.25	-0.35	1.78					
1877.75	5.02	3.52		3.81	2.02		
1881	3.51	1.21		2.95	2.59		
1884	4.75	0.28		-1.39	-1.91		
1886.5	5.08	5.20	12.21	4.46	3.58		
1888	-2.46	1.43	17.89	5.18	4.66		
1889.75	-4.59	-7.27	11.49	8.99	7.76		
1891	-7.38	-4.90	12.81	15.63	14.11		
1892.25	-9.52	-3.35	17.90	6.72	5.23		
1893.75	-3.59	-3.19	24.68	-23.22	-24.82		
1895.25	6.21	1.66	30.24	-13.33	-13.41		
1896.5	12.13	3.36	35.37	5.77	8.11		

(continued)

TABLE A-3 (continued)

PART F (continued)

Mid-point[a]	Series 27: Rail Consumption	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.[b]	Series 29: All Telephone Systems	Series 30: 1929 Prices	Series 31: Current Prices	Series 32: 1947–49 Prices	Series 33: Current Prices
1899	13.10	5.97	27.08	11.49	14.52		
1900	11.04	7.63	21.00	9.41	11.83		
1903	4.07	2.96	13.79	9.57	11.97		
1904	3.00	-0.56	14.96	10.66	13.41		
1906.75	-3.89	-5.21	-2.51	6.77	8.97		
1907.75	-2.75	-4.34	-9.91	4.98	6.89		
1910	2.94	2.48	4.74	2.64	4.53		
1911	-0.19	-1.25	10.56	-0.79	0.90		
1913.5	-6.09	b	-1.03	-9.71	-5.26		
1914.5	-6.18	b	-5.45	-10.97	-4.02		
1917.25	-5.48	b	-15.59	-8.20	5.40		
1918.25	-2.88	21.16	-0.12	-2.13	9.63		
1920.25	4.79	26.43	39.22	15.10	12.87	6.81	4.67
1921.25	6.45	-3.39	35.04	20.20	14.84	18.08	13.31
1923	7.89	0.24	21.28	14.69	13.71	17.31	16.73
1924	6.95	6.64	14.33	7.00	6.60	11.03	10.94
1926	0.57	17.11	3.92	0.44	-5.17	3.52	2.88
1927.5	-9.05	-3.47	-2.08	-2.25	-3.16	-0.92	-1.83
1930.25	-15.72	-15.78	-17.39	-10.56	-11.40	-11.52	-12.71
1932.25	-14.42	-6.33	-26.40	-13.41	-13.93	-16.42	-17.36

(continued)

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TABLE A-3 (continued)

PART F (concluded)

Mid-point[a]	Series 27: Rail Consumption	Increase in Wire Mileage		Gross Capital Expenditures, All Regulated Industries, Ulmer		New Private Public Utilities Construction, Commerce-Labor	
		Series 28: Western Union Telegraph Co.[b]	Series 29: All Telephone Systems	Series 30: 1929 Prices	Series 31: Current Prices	Series 32: 1947-49 Prices	Series 33: Current Prices
1936.75			3.53	1.03	2.67	-1.22	0.40
1938.5			15.29	5.39	7.88	4.86	7.59
1943.25			13.35	8.11	13.41	8.03	13.97
1944.75			20.28	13.16	18.54	13.44	19.50
1948.25			9.10			11.33	17.22
1949.5			2.19			4.62	10.07
1952.75			14.80			0.73	5.30
1953.75						0.31	4.91

	PART G. SHIPBUILDING		PART H. PUBLIC CONSTRUCTION	

| Mid-point[a] | Series 34: Tonnage of Merchant Vessels Built in U. S. | Series 35: Long's Index of Value of Public Building Permits | New Public Construction, Commerce-Labor | |
			Series 36: Current Prices	Series 37: 1947-49 Prices
1856.25	-17.21			
1858	-23.21			
1860	-2.03			
1861.75	9.70			
1864.25	5.61			
1866.25	-2.44			
1868.75	-4.74			
1871.25	-0.51			
1874.25	-0.81	-17.84		
1877.75	-2.50	-9.73		
1881	-4.02	6.60		
1884	-8.99	17.91		
1886.5	3.78	13.29		
1888	20.45	4.07		
1889.75	12.67	3.58		
1891	-7.09	11.32		
1892.25	-23.94	10.98		
1893.75	-16.43	-16.21		
1895.25	6.85	-2.46		
1896.5	18.35	12.18		
1899	16.97	3.79		
1900	13.43	8.18		
1903	-2.02	12.76		
1904	-0.83	5.90		
1906.75	1.71	-5.98		
1907.75	-6.27	-3.43		
1910	-12.26	9.25		
1911	-5.23	7.35		
1913.5	11.95	-4.30		
1914.5	24.68	-6.57		
1917.25	41.45	-8.16		
1918.25	33.57	8.45		
1920.25	-22.09	45.25	-7.09	-10.94
1921.25	-50.74	39.61	2.93	6.23
1923	-50.31	13.13	7.43	8.05
1924	-36.37	7.07	8.12	8.60
1926	-1.20	11.59	6.53	8.24
1927.5	3.35	5.69	4.06	7.12
1930.25	-1.16		0.52	2.63
1932.25	-3.53		0.23	0.05
1936.75	23.13		9.57	7.75
1938.5	25.69		8.73	6.91
1943.25	-1.09		-10.11	-14.99
1944.75	-31.49		-2.93	-11.30
1948.25			20.93	14.93
1949.5			19.73	16.42
1952.75			8.62	6.34
1953.75			7.10	4.65

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^aInterval between the midpoints of the reference-cycle standings being
compared. For example, as indicated in footnote a to Table A-2, the mid-
point of the peak-to-peak cycle, 1853–1856, is 1854.5, and that for the
peak-to-peak cycle, 1856–1860, is 1858. The midpoint of the interval between
1854.5 and 1858 is 1856.25, the first date shown in the present table. A
date not followed by a decimal is centered at June 30 of that year. Decimals
following a date indicate, in terms of quarters, the point beyond June 30 at
which the interval is centered. Thus:

An entry of:	Would be centered at:
1856	June 30, 1856
1856.25	Sep. 30, 1856
1856.5	Dec. 31, 1856
1856.75	Mar. 31, 1857

^b1871–1911 based on fiscal-year data; 1918–32 based on calendar-year data;
see Table A-1, footnote b. This break in the continuity of the series pre-
vents computation of growth rates for the intervals centered at 1913.5,
1914.5, and 1917.25.

Part II: Source Notes

A. AGGREGATE CONSTRUCTION

1. Gross new construction in current prices, Kuznets.
   1869-1918: Annual data underlying the five-year moving averages
   in *Capital in the American Economy* (27), Table R-30, col. 5.
   1919-44: Ibid., Table R-4, col. 1.
   1945-59: Sum of estimates for nonfarm residential construction (ex-
   cluding nonhousekeeping units), government construction, and
   "other" construction (including nonhousekeeping units and pe-
   troleum and natural gas well drilling). For 1945, the data are
   from *National Income, 1954 Edition* (43), Table 31, p. 209, or
   The Economic Report of the President, January 1962, Table B-35,
   p. 249; for 1946-55, from *U.S. Income and Output* (43), Table
   V-3; for 1956-59, from *Survey of Current Business* (45), July
   1962, Table 35.

2. Gross new construction in 1929 prices, Kuznets.

    1869-1918: Annual data underlying the five-year moving averages in *Capital in the American Economy* (27), Table R-30, col. 10.

    1919-43: Ibid., Table R-5, col. 1.

    1944-59: Sum 'of estimates for nonfarm residential construction, "other" private, military, highway, sewer, and "other" public construction. The Kuznets 1929 price series for 1943 were extrapolated to 1957 by the 1947-49 price series in *Statistical Abstract, 1960* (45), p. 751, and from 1957 to 1959 by the 1954 price series in *Survey of Current Business* (45), July 1962, p. 25.

    Nonhousekeeping units were assumed to be the same percentage of all nonfarm residential construction as indicated by the current price series. For petroleum and natural gas well drilling, the Kuznets 1929 price estimate for 1946 was extrapolated to 1956 and then to 1959 by the 1954 price series given for 1946-1956 in *U.S. Income and Output* (43), p. 191, and for 1956-1959, in *Survey of Current Business* (45), July 1962, p. 25.

3. Index of value of construction in current prices, NBER.

    This is one of three indexes constructed by the author and discussed in Part III of this appendix. The following notes identify the series combined into the index, and indicate the weight assigned to each.

    Segment I. 1870-97: The index is the weighted average of two series, each of which was first expressed as a relative of its average standing in 1870-97.

    a. Riggleman-Isard index of value of building permits (Series 11), weighted 0.75.

    b. Gross capital expenditures by railroads in current prices, Ulmer.

    (*Capital in Transportation, Communications, and Public Utilities* (42), Table C-1), weighted 0.25.

    Segment II. 1889-1918: The index is the weighted average of three series, each of which was first expressed as a relative of its average standing in 1889-1918.

    a. Expenditures for new nonfarm dwelling units in current prices, Blank (Series 19), weighted 0.41.

    b. Long's index of the value of nonresidential building permits (Series 22), weighted 0.23.

    c. Gross capital expenditures by all regulated industries in current prices, Ulmer (Series 31), weighted 0.36.

4. Index of value of construction in constant prices, NBER (See introductory note to Series 3).

    Segment I. 1870-97: The index is the weighted average of two series, each of which was first expressed as a relative of its average standing in 1870-1897.

        a. Riggleman-Isard index of value of building permits (Series 11), deflated by the price index implicit in Kuznets, Series 1 and 2, weighted 0.75.

        b. Gross capital expenditures by railroads in 1929 prices, Ulmer (*Capital in Transportation, Communications, and Public Utilities* (42), Table C-1), weighted 0.25.

    Segment II. 1889-1918: The index is the weighted average of three series, each of which was first expressed as a relative of its average standing in 1889-1918.

        a. Expenditures for new nonfarm dwelling units in 1929 prices, Blank (Series 20), weighted 0.41.

        b. Long's index of the value of nonresidential building permits (Series 22), corrected for price changes by the price index implicit in Kuznets, Series 1 and 2, excluding nonfarm residential and military construction. The latter series are unpublished estimates underlying the five-year averages given in Kuznets, *Capital in the American Economy* (27), Table R-30, weighted 0.23.

        c. Gross capital expenditures by all regulated industries in 1929 prices, Ulmer (Series 30), weighted 0.36.

5. Index of physical volume of construction, NBER: See introductory note to Series 3.

    Segment I. 1856-97: The index is the weighted average of three series, each of which was first expressed as a relative of its average standing in 1856-97.

        a. Long's index of the number of residential building permits (Series 18), weighted 0.51.

        b. Long's index of the number of nonresidential building permits (Series 23), weighted 0.23.

        c. Rail consumption (Series 27), weighted 0.26.

Segment II. 1889-1918: The index is the weighted average of three series, each of which was first expressed as a relative of its average standing in 1889-1918.
  - a. Number of nonfarm dwelling units started, Blank (Series 21), weighted 0.49.
  - b. Long's index of the number of nonresidential building permits (Series 23), weighted 0.27.
  - c. Rail consumption (Series 27), weighted 0.24.

6. Total construction activity, in current prices, Commerce-Labor: Sum of new construction, Series 7, and repairs and maintenance. The latter series is given for 1915-44 in *Construction Volume and Costs, 1915-1956* (44), for 1945-56 in *Annual Report of the HHFA, 1959*, p. 306, and for 1957-59 in *Statistical Abstract, 1961* (45), p. 747.

7. New construction in current prices, Commerce-Labor.
   1915-44: *Construction Volume and Costs, 1915-1956* (44).
   1945-56: *Value of New Construction Put in Place, 1945-58* (44).
   1957-59: *Survey of Current Business* (45), July 1962, Table 35.

8. New construction in 1947-49 prices, Commerce-Labor: Sum of new private construction and new public construction, Series 37. New private construction is given for 1915-45 in *Construction Volume and Costs, 1915-1956* (44), and for 1946-57 in *Value of New Construction Put in Place, 1945-58* (44). It was extrapolated from 1957 through 1959 by the 1954 price series (excluding petroleum and natural gas well drilling) in *Survey of Current Business* (45), July 1962, Table 36.

B. TOTAL URBAN BUILDING

9. Riggleman's value of building permits per capita: Riggleman, *Variations in Building Activity* (39).

10. Riggleman's value of building permits per capita, in 1913 prices, as percentage of basic trend: *Ibid.*

11. Riggleman's index of value, as adjusted by Isard: Series 9 adjusted to reflect population growth in urban communities: Colean and Newcomb, *Stabilizing Construction* (12), Appendix N, Table 2. See Appendix A, Part III of this paper, for nature of adjustment.

12. Long's index of the value of building permits in 27 cities: Long, *Building Cycles* (33), Appendix B, Section 2.

13. Long's index of the number of building permits in 29 cities: *Ibid.*, Appendix B, Section 3.

14. Long's index of value, Series 12, as adjusted by Colean and Newcomb: Colean and Newcomb, *Stabilizing Construction* (12), Appendix N, Table 2. See Appendix A, Part III of this paper, for nature of adjustment.

15. Colean-Newcomb index of the value of new building in current prices: *Ibid.*, Appendix N, Table 3.

16. Colean-Newcomb index of the value of new building in constant prices: Calculated from *ibid.*, Appendix N, Tables 3 and 4.

C. NONFARM RESIDENTIAL BUILDING

17. Long's index of the value of residential building permits in twenty-seven cities: Long, *Building Cycles* (33), Appendix B, Section 2.

18. Long's index of the number of residential building permits in twenty-nine cities: *Ibid.*, Appendix B, Section 3.

19. Expenditures for new nonfarm dwelling units in current prices, Blank.
    1889-1950: Blank, *Volume of Residential Construction* (4), Appendix A, Table 18.
    1951-52: Grebler, Blank, and Winnick, *Capital Formation in Residential Real Estate* (21), p. 335.
    1953-59: Annual Report of the HHFA, 1959, p. 306.

20. Expenditures for new nonfarm dwelling units in 1929 prices, Blank.
    1889-1950: Blank, *Volume of Residential Construction* (4), Appendix A, Table 18.
    1951: Grebler, Blank, and Winnick, *Capital Formation in Residential Real Estate* (21), p. 335.
    1952-59: Series 19 adjusted by a price index calculated by extrapolating that implicit in the estimates for 1951. Extrapolation to 1956 was by the index implicit in the 1947-49 series given in *Value of New Construction Put in Place, 1945-58* (44). Extra-

polation to 1959 was by the index implicit in the 1954 price series given for all nonfarm residential construction in the *Survey of Current Business* (45), July 1962, Table 36.

21. Number of nonfarm dwelling units started, Blank.
    1889-1950: Blank, *Volume of Residential Construction* (4), Appendix A, Table 16.
    1951-52: Grebler, Blank, and Winnick, *Capital Formation in Residential Real Estate* (21), p. 334.
    1953-59: Annual Report of the HHFA, 1959, p. 290.

21a. Production of residential housekeeping dwelling units, Gottlieb: By letter from Manuel Gottlieb. See also Appendix A, Part III of this paper.

D. PRIVATE NONRESIDENTIAL BUILDING

22. Long's index of the value of nonresidential building permits in twenty-seven cities: Long, *Building Cycles* (33), Appendix B, Section 2.

23. Long's index of the number of nonresidential building permits in twenty-nine cities: *Ibid.*, Appendix B, Section 3.

24. New private nonresidential construction in current prices, Commerce-Labor.
    1915-51: Construction Volume and Costs, 1915-1956 (44).
    1952-57: Value of New Construction Put in Place, 1945-58 (44).
    1958-59: Survey of Current Business (45), July 1962, Table 35.

25. New private nonresidential construction in 1947-49 prices, Commerce-Labor: From the sources indicated for new private construction in the notes to Series 8.

E. FARM CONSTRUCTION

26. New farm construction in 1947-49 prices, Commerce-Labor: From the sources indicated for new private construction in the notes to Series 8.

F. TRANSPORTATION AND OTHER PUBLIC UTILITIES CONSTRUCTION

27. Rail consumption: Data compiled by NBER from the *Annual Statistical Report of the American Iron and Steel Institute*, New York.

28. Increase in wire mileage, Western Union Telegraph Company: *Statistical Abstract* (45), *1913*, p. 258, *1920*, p. 327, *1934*, p. 324, *1935*, p. 338, and *1943*, p. 418.

29. Increase in wire mileage, all telephone systems.
1881-1936: By letter from American Telephone and Telegraph Company.
1937-56: Statistical Abtract (45), *1957*, p. 512.
1957: Estimated.

30. Gross capital expenditures by all regulated industries in 1929 prices, Ulmer: *Transportation, Communications, and Public Utilities* (42), Table B-1.

31. Gross capital expenditures by all regulated industries in current prices, Ulmer: *Ibid.*

32. New private public utilities construction in 1947-49 prices, Commerce-Labor: From the sources indicated for new private construction in the notes to Series 8.

33. New private public utilities construction in current prices, Commerce-Labor: From the sources indicated for Series 24.

G. SHIPBUILDING

34. Gross tonnage of merchant vessels built in the United States and documented: *Historical Statistics, Colonial Times to 1957* (45), Series Q 179. Data for 1855-1939 are for fiscal years ending June 30; data for 1940-57 are for calendar years. Smoothed data for this series were computed on the basis of regular calendar-year chronology throughout, instead of on a fiscal-year chronology until 1939. This mistake, discovered in the final stages of this study, was not corrected because we felt that the difference in results would be negligible.

H. PUBLIC CONSTRUCTION

35. Long's index of the value of public building permits in fourteen cities: Long, *Building Cycles* (33), Appendix B, Section 1.

36. New public construction in current prices, Commerce-Labor: From the sources indicated for Series 7.

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37. New public construction in 1947-49 prices, Commerce-Labor: From the sources indicated for new private construction in the notes to Series 8.

Part III: Description and Evaluation of Data

This section of the appendix describes in a general way, though at some length, the character and reliability of the various statistical series studied in the paper.[1] We deal first with the various major sectors of construction and then with the two classes of aggregates, namely, total urban building and aggregate construction.

NONFARM RESIDENTIAL BUILDING

The most widely used series in the collection are the so-called Blank-Official estimates. For 1889-1920, these are the work of David M. Blank, given in *The Volume of Residential Construction* (4). For 1921-36, the figures rest on the estimates by David L. Wickens and Ray R. Foster, given in *Non-Farm Residential Construction* (48). The Bureau of Labor Statistics subsequently revised the Wickens-Foster figures for the 1930's and carried the estimates forward, as described in *Techniques* (46). Beginning in 1958, the estimates were prepared by the Bureau of the Census. The figures used in this study are drawn from Blank's publication, which incorporates the Wickens-Foster and BLS estimates with his own in a series running from 1889 to 1950. For 1951 and 1952, the series are extended by those shown in Grebler, Blank, and Winnick, *Capital Formation in Residential Real Estate* (21). For 1953-57, the BLS series are used, and for 1958-59, the Bureau of the Census Series.

All the segments of the Blank-Official estimates involve essentially the same elements. All rest on reports of the dwelling units whose construction was authorized in building permits granted in samples of communities requiring such permits for building work. The permit data are available in two forms: a count of the number of dwelling units authorized, and the estimated construction cost of structures as stated on the permits granted. In the first form, the figures lead up to estimates

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[1] A complete list of the series used, with references to the sources from which the data were obtained, is given in Part II.

of "starts," that is, the number of dwelling units on which work was begun in stated periods. Subject to certain qualifications, these may be regarded as estimates of the physical volume of building. In the second form, the figures lead up to estimates of the value of residential building in current prices and, after correction for price changes, to estimates of the physical volume of building, i.e., values in constant prices.

In either form, the final estimates we use refer to all nonfarm, private, permanent, housekeeping dwelling units.[2] A major problem, therefore, was to expand the number and permit-value of dwelling units authorized by the permits granted in the sample communities to aggregates for all nonfarm building. This involved two steps for the number of dwellings and still a third for permit-values. The first step was to build up the number and value of reported permits in sample communities to a total for all urban, incorporated places. This was accomplished by first classifying the sample communities by size, region, and (in later years) by still other characteristics. The figures for the sample communities in each class were then built up to a total for the class on the basis of an estimated relation between growth in population or families in the reporting and nonreporting communities.[3] The second step was to expand the total for urban communities by adding an estimate for rural nonfarm building. Blank's method for 1889-1920 was to apply relationships based on the population change of rural nonfarm and urban areas to the estimates for urban areas, after making certain allowances for the reclassification of areas from rural to urban status. Wickens' procedures were essentially similar though more complicated. Beginning in 1945, the BLS initiated direct surveys of building in samples of rural nonfarm communities and expanded the figures from these surveys, rather than those from urban communities, to an estimated total for all nonfarm areas.

These procedures yielded estimates of the total number of nonfarm

[2]Nonhousekeeping facilities would add varying but small amounts to the estimates we use. According to Blank's figures, such facilities would have added less than 2 per cent in the early 1890's, under 7 per cent in the midtwenties, and about 4 per cent in the late forties.

[3]This was the procedure through the early 1940's. Later, when the sample of permit-issuing communities achieved nearly full coverage in each class, simple population relations were substituted. The stratification plans of Blank, Wickens and Foster, and the BLS differed in some respects; and the BLS plan was revised on a number of occasions.

dwelling units to be started and of the permit-values of units in urban areas. To obtain comparable value figures for units in rural nonfarm areas, Blank made an adjustment for the normal difference between the average construction cost of urban and of rural nonfarm dwelling units for the years 1889 to 1920 on the basis of Census reports of the average value of existing units in each category and on less comprehensive information on the value of newly built units. The BLS, which depends on Chawner's estimates for the 1920's and early 1930's, as shown in *Construction Activity* (11), proceeded in similar fashion, but later pieced out its information with periodic surveys of building costs.

Several additional adjustments were required to convert the data into figures representing the number of housing starts—as contrasted with the number of dwelling units authorized by permit—and the amount actually expended on construction in each period.

To move from permits to starts required small allowances for the fact that some dwellings are constructed without authorization in permit-issuing areas, that some permits are allowed to lapse, and that the beginning of building operations authorized by the permits issued in a given month is generally spread over the two months following. None of these adjustments appears to be a serious matter in terms of the figures we use, especially when studied in the form of annual data.

Moving from permit-values to construction expenditures is a more considerable affair. Permit-valuation is regarded as an understatement of true cost partly because real estate assessments and permit fees are often based on permit-values and partly because such values are not intended to include certain elements of the full cost of buildings: for example, they exclude certain items of equipment such as wiring, plumbing, and heating; architects' and engineers' fees; land development costs; and operative builders' margins. Blank added a flat 18 per cent to permit-values to allow for the difference between permit-values and those elements of cost they are intended to represent. Chawner added 17.6 per cent, while the BLS, since 1945, has added varying percentages depending on those shown by occasional field surveys. For the years 1948-50, these ranged from 8 to 14 per cent for rural nonfarm units, while for the years 1945-50 they ranged from 12 to 25 per cent for urban units. Blank added a flat 8 per cent to allow for the neglected elements of cost for the years 1890-1914. Since that time, the figures reflect varying adjustment ratios of the same order of magnitude as

those developed by the BLS on the basis of occasional surveys and other information. Neither Blank's nor the BLS adjustments, however, included an allowance for builders' profits until the BLS began to include such an allowance in 1945.

Next, the estimates of the full cost of dwellings started had to be spread over the actual period of building in order to represent the value of work put in place. In recent years, the BLS has done this by applying empirically derived "progress patterns" to monthly estimates of the value of work started. The annual data in the segment for which the Blank-Official series depends on Chawner without revision (1921-28) assumes that one-third of the work started in any given year was carried over to the following year. This allowance for carryover, however, appears to have been much too large when compared with the experience of recent years. Hence, Blank used a carryover ratio of 10 per cent for the years for which he developed his own estimates, that is, 1889-1920.

Finally, the estimates of current price values had to be corrected for changes in the price of new dwelling units in order to obtain an index of values in constant prices. Unfortunately, no true index of the price of new dwellings is available. The Blank-Official series has, therefore, been corrected for price changes on the basis of an index which reflects the two major components of cost—wage rates, and the price of the more important building materials—combined by weights deemed to represent the normal share of each component in the total expense of building.

The many elements of estimation in the Blank-Official series may cause them to misrepresent the real fluctuations in several perhaps important ways. For the most part, however, the errors cannot be measured; and it *is* even hard to identify them. We can only touch on some of the more obtrusive possibilities.

One difficulty inheres in the limited, if expanding, scope of the sample of urban permit-issuing communities during the entire period from 1889 to 1935. The reporting sample grew gradually from 25 cities, accounting for 22 per cent of the urban and 14.5 per cent of the nonfarm population in 1890, to 257 cities, accounting for 63 per cent of the urban and 50 per cent of the nonfarm population in 1920. Throughout this period, however, the coverage of the very large cities was much better than that of smaller cities and towns and much better in the north-

ern and eastern than in the southern and western regions. Cities under
25,000 in population were entirely unrepresented between 1920 and
1934 and virtually unrepresented before that time.[4] The skewed char-
acter of the reporting sample may well have distorted the volume and
movement of building in the poorly covered size and regional classes.
Moreover, these deficiencies would have carried over into the figures
of building in the rural nonfarm areas, the estimates for which de-
pended on two assumptions: (1) that as between decades, rural non-
farm building bore the same relation to the increase in rural nonfarm
population as urban construction bore to the increase in urban popula-
tion (or that dwelling units built per 100 additional persons were the
same in urban and rural nonfarm areas), and (2) that the variation
within each decade was proportional to the variation in urban building.
After the 1930's, the sample of reporting urban communities was greatly
enlarged and finally achieved essentially full coverage of incorporated
urban communities. But after 1945 the estimates for rural nonfarm
building were based on field surveys of a relatively small sample of
such communities. Moreover, it appears in the light of developing in-
formation that the surveys omitted a considerable fraction of building
in such areas. Since nonfarm building in rural areas accounted for about
one-third of all residential building from 1890-1920, for about 20 to 25
per cent in the 1920's, and grew to approximately half the total in the
early 1950's, the somewhat limited basis for the estimates of rural non-
farm building must be a matter of concern to this study.

The most obtrusive difficulty that apparently arose from the inade-
quate urban samples and from the incomplete survey of unincorporated
areas is that the level of building as measured in number of units was
probably chronically understated. This is suggested by comparisons
between decade totals of building as revealed by the Official series and
benchmarks provided by increments to the stock of dwellings (adjusted
for demolitions, conversions, etc.) from Census data and from the
National Housing Inventory: 1956. As a consequence, the most recent
revision of the Official series (carried out by the Census Bureau in
1960) raises the level of the figure for housing starts in 1959 by 13 per
cent, of which the Census Bureau in its "Construction Reports" (43)
attributes 10.5 per cent to improvements in coverage, chiefly in areas

[4]Cf. Blank, *The Volume of Residential Construction* (4), Tables 9 and 22;
and Wickens, *Non-Farm Residential Construction* (47), Table EM-1.

previously classified as rural nonfarm. On the same evidence, Grebler and Maisel, in their *Determinants of Residential Construction* (22), p. IV-17, state that:

> Between 1930-40, 1940-50 and 1950-56, the BLS estimates of housing starts probably accounted for only 75, 70, and 80 per cent, respectively, of the reported net change in units standing after liberal allowances for conversions and demolitions.

On the basis of the so-called "vintage" data provided in the 1950 and 1940 Censuses of Housing, Margaret Reid, in her "Capital Formation in Residential Real Estate" (37), comes to similar conclusions concerning the estimates for the 1930's and 1940's and extends the data to earlier decades; and so does Manuel Gottlieb, in his *Estimates of Residential Building* (20), but neither writer contends that the size of the underestimate can be stated with accuracy.[5]

While so much seems clear, it must be remembered that it is not the level, but the trend and cyclical variability of the data that are of direct concern to the present study. There appears, however, to be but

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[5]The Censuses of Housing of 1940 and 1950 asked owners of buildings to report the year in which their properties were built, and this permitted the Census to provide tables of the number of dwelling units added to the stock still standing at the time of these Censuses, classified according to the year in which the structures in which they were located were built. These figures overstate the number of units built in any period by the net number subsequently added by conversion or transfer from farm to nonfarm stock, but they understate building by the number of units lost by demolition or otherwise. The Census count of dwelling units also includes nonpermanent and nonhousekeeping units, separate family quarters in single-family dwellings, and those located in structures not intended primarily for residential purposes, all of which are excluded from the Blank-Official building estimates.

Demolitions presumably proceed at a generally constant rate, but since they are cumulative, they affect figures for earlier decades more than those for later decades. On this account one might expect the building figures to be a higher proportion of the vintage figures for earlier decades than they are for later decades. A very large proportion of all the converted units standing in 1940 and 1950 were added during the thirties and forties. Presumably, those converted during the forties were added chiefly to structures built before 1940 and those converted during the thirties, to structures built before 1930; but there is no way to distribute these units by decade.

Transient and nonhousekeeping units are sometimes of very considerable importance, but since the loss rate among them must be very high, it is questionable whether they affect figures for any except the decade immediately preceding a census.

little reliable evidence that these characteristics of the series were systematically distorted by the inadequacies of the sample data. In particular, it does not appear from the Census benchmarks that the degree of understatement of housing starts was so consistently greater in the early decades covered by the Blank-Official series than in the later as to suggest a trend toward increasing understatement.[6] Reid and Gottlieb, for various reasons, both conclude, however, that the degree of underestimate varied from decade to decade.[7] Both believe that the Blank-Official level for the 1890's was high compared with the level for the 1900's; and the level for the 1920's, high compared with the level for the decades preceding and following. If they are correct, the long-wave expansion in the early 1900's would be damped in Blank's figures while the boom of the twenties and the depression of the 1930's would be exaggerated.[8]

[6]See Reid (37), Table 3.

[7]Reid (37), pp. 136-138; Gottlieb (20).

[8]Reid's conclusions appear to be based on changes in the ratio of building in the successive decades, as estimated by Blank and BLS, to the vintage (or year-built) data from the 1940 and 1950 Censuses. She supplies the following table:

	Period of Construction	Number of New Eligible Dwellings[a] Per 100 New Dwellings of All Types
1950	Census of Housing[b]	
	1945 and later	65
	1940-44	59
	1930-39	50[c]
	1920-29	85
1940	Census of Housing[d]	
	1935 and later	64
	1930-34	49
	1925-29	89
	1920-24	89
	1910-19	66
	1900-09	69
	1890-99	94[e]

[a]Grebler, Blank, and Winnick, *Capital Formation in Residential Real Estate* (21), p. 332. "Eligible dwellings" is a term used by Reid to refer to dwelling units included in the Blank-Official figures, viz., "new private permanent nonfarm housekeeping dwelling units."

[b]*Census of Housing, 1950*, Vol. I, Part 1, Table 6. The remaining stock of 1950 is reported only for "1919 or earlier."

Evidences of Long Swings in Aggregate Construction

The method by which rural nonfarm starts were estimated may also give rise to doubts about the reliability of the series in representing

^cThis ratio for the twenties is slightly lower than that indicated by the data in the *Census of Housing, 1940.* The *1950 Census of Housing* reports more nonfarm dwellings built in the twenties than does the *1940 Census.* Some of the increase may be the result of an excess of conversions over losses. Some of it is undoubtedly the result of transfers from farm to nonfarm during the decade.

^d*Census of Housing, 1940,* Vol. II, Part 1, Table 5.

^eThe longer the interval between the census date and the year of construction, the less useful is such a comparison. Any dwelling in the 1940 stock built in 1890-99 was at least forty years old. For this decade, the number reported in 1940 may not describe the number constructed. However, offsetting tendencies may have been present. Conversion of original dwelling units would tend to increase, and losses to decrease, the number of dwellings remaining in the 1940 stock. But any such error seems unlikely to account for the difference in the ratios shown for 1890-99 and 1900-09.

As already indicated, conversions were especially large in the 1930's. If the units so added were most heavily concentrated in the relatively modern, but not new, structures built during the 1920's, as seems plausible, then the apparent shifts in coverage from the tens to the twenties and then to the thirties would be even greater than Reid's ratios suggest.

Gottlieb reaches similar conclusions partly on the basis of the same evidence, but partly on the basis of other indications. His own estimates of the movement from the 1890's to the 1900's, based on national projections from Ohio statistics (see below), show a larger rise than Blank's. And Gottlieb argues that the under-coverage of the Official figures in the 1930's was especially large. The vintage data for that decade from the 1940 Census are about 50 per cent higher than the Official figures for new private, permanent, housekeeping dwelling units. Since conversions and demolitions of structures which, on the average, were only some five years old would have been unimportant, the chief adjustments required are those to allow for additional dwelling units in nonhousekeeping structures (trailers, cabins, shacks, certain hotels, etc.). M. H. Naigles, in his "Housing and the Increase in Population" (35), has put this number at 516,000, which must overstate the relevant figure to the extent that such units were contrived in buildings constructed before 1930. It is possible, therefore, that the Official figure understates new building of nonfarm, permanent, housekeeping dwelling units by about a million units.

Naigles has made an attempt to reconcile the Official figure of 2.734 million permanent, housekeeping units constructed during 1930-39 with an estimate of the total increase in dwelling units standing, 4.014 million units, according to the broader Census definition. If all of Naigles' figures were accepted, no change in the Official figure for new permanent housekeeping units would be required. They are, however, difficult to accept in the face of the unexplained discrepancy between the Official figures and the year-built (vintage) data for the decade. And Naigles' reconciliation involves a series of uncertainties about vacancies in 1930, the number of structural and nonstructural conversions, the number of units lost by demolition or disaster, and the number of families living in nonhousekeeping structures. His figures deserve respect, but do not remove the doubts Gottlieb and others entertain about undercoverage in the Official series.

cyclical movements. Until the 1940's, movements within decades were implicitly taken to be proportionate to those in urban communities. Yet they may actually have differed in amplitude and timing. Lacking independent data for this category, the possibility cannot be checked. Given that the rural nonfarm category was only one-third the total during most of the period and that the building waves in residential housing were well marked and pervasive, the distortion of the total figures from this cause, although not of major importance, may not be negligible. A comparison of interdecade changes as shown by the Blank-Official figures and by Gottlieb gives some indication of the order of magnitude of these uncertainties.

	Percentage Changes Between Decades	
	Blank-Official	Gottlieb
1890-99 to 1900-09	+23	+68
1900-09 to 1910-19	− 1	0
1910-19 to 1920-29	+95	+78
1920-29 to 1930-39	−61	−45

On this showing, the Blank-Official figures of dwelling units started may not portray the size of the long-swing movements accurately, but they disclose the broad direction of change. Doubtless, they can also be in error as to the exact years when peaks or troughs were reached.

Other problems arise when one moves from units started to measures of expenditure. Questions concerned with the phasing of expenditures for particular units are neglected as minor. We are concerned with annual data; and the portion of the cost of dwellings started in one year that is actually spent in the next appears to be small.[9] The actual buildup of expenditures, however, raises more serious matters. Since, for most of the period, permit valuations are raised to full values by applying constant raising ratios to allow for undervaluation, land development costs, architects' and engineers' fees, and builders' margins to cover overhead costs and profits themselves, the question arises of whether these elements of price fluctuate during long swings with the same amplitude and timing as do costs of materials and labor. Since this procedure adds something over 25 per cent to the permit valuations, there is room for significant error. The allowance for profits is of particular concern, since their amplitude of fluctuation is likely to have

[9]Blank, *The Volume of Residential Construction* (4), p. 55.

been more violent than that of other elements of price. On the other hand, their share in the total price is small. The true fluctuations of residential housing expenditures in current prices may, therefore, have been greater or smaller than the Blank-Official figures suggest, and the question cannot be tested.

Again, there are questions concerning the conversion of expenditures in current prices to expenditures in constant prices.[10] The deflating index that is employed in the Blank-Official series, as in most construction deflators, is a weighted index of construction materials prices and of wage rates for building labor, with no allowance for the changing cost per unit of other cost elements or for profits per unit. Insofar as the weighted unit prices of materials and labor do actually represent the materials and labor costs per dwelling unit of a representative type, the restricted character of the index is entirely appropriate. For other costs and profits are included in the current price figures only in constant proportion to permit valuations which chiefly reflect materials and labor costs. There are, however, real doubts whether the construction cost index does properly represent the movement of the labor and materials costs per representative dwelling unit.

In the first place, the list of materials and equipment whose prices are included in the index excludes some types, particularly the newer kinds. This omission presumably gives the index an upward secular bias. Secondly, wage rates do not allow for the changing mix of skills; this also ought to give the index an upward bias. Nor do wage rates allow for the spread of unionization, which biases it downward. The index makes no provisions for improvements in the productivity of materials and labor, which presumably makes the secular rise of the index greater than it should be. On the other hand, the index neglects the secular rise in the average age of building workers, which may do the opposite. The neglect of changes in productivity in the index may also distort its picture of the behavior of costs per unit during long swings in building. Experience in industry at large suggests that productivity rises especially rapidly during periods when the intensity of use of capital and of employed labor is rising rapidly and especially slowly when intensity

[10]See Grebler, Blank, and Winnick, *Capital Formation* (21), Appendix C, for a critical discussion of their deflation procedures.

of use is declining rapidly.[11] If this is also true in the construction in-
dustry, the nature of the construction cost index would tend to damp
the amplitude of fluctuation in construction expenditure during at least
the early stages of both upswings and downswings of building activity
and perhaps in the remainder of these phases as well.

We cannot measure the strength of these various offsetting defi-
ciencies nor even be sure we have gauged the direction of their effects
correctly. Nevertheless, it may be that the deflated figures can serve the
general purposes of this study of long swings fairly well. One indication
is the comparison that Grebler, Blank, and Winnick[12] provide between
the construction cost index used for the Blank series and an index of
house prices in a sample of cities. The secular movements of the two
indexes are remarkably alike. They do, however, differ in significant
ways in particular periods. The house-price index, for example, falls
less than does the index of construction costs during the downswing of
the 1890's, and it rises relative to construction costs in the period after
1908. Deflated by house prices, the long downswings in building during
these periods would seem to be more pronounced. On the other hand,
construction costs rose 30 per cent more than house prices in 1920 and
fell as much more in 1921. This would give the deflated building figures
a peculiar pattern in this period if house prices are indeed a better index.

Another reassuring consideration is the general similarity between
deflated expenditures, number of units started and, indeed, expendi-
tures in current prices. Again there are differences in particular periods,
but the general picture of long swings in residential building that might
be formed on the basis of any of these series is broadly similar; from
this, it may be concluded that physical activity, not price movements,
have dominated the longer waves in the industry.

One should remember, of course, that the alternative view of the
physical volume of construction that is gained from the series of housing
starts is subject to distortions of its own. It gives no representation to
changes in the average real value per dwelling unit either over long
periods of time or during long swings. Yet this average real value
changes as the quality of housing of given types improves or deterio-

[11]Abramovitz, "The Nature and Significance of Kuznets Cycles" (2), pp. 234-
241.

[12]*Capital Formation* (21), Appendix C.

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rates—a question in dispute among the experts—and as the proportions of single-family and multiunit and of urban and rural nonfarm dwellings change. The secular shifts in these proportions have not been uniform in direction, nor have there been regular long waves in the composition of new houses. There have, however, been changes which persisted for some years which house-building expressed merely in number of units does not measure.

In addition to the Blank-Official estimates, we employ a new series of dwelling units built which has been contrived by Manuel Gottlieb, and two well-known series by Clarence D. Long. Long's series, given in *Building Cycles and the Theory of Investment* (33), were originally included in the collection in order to give a view of the behavior of residential building over a longer period than is covered by Blank. His series are in two forms; one, representing the number of permits granted, begins in 1856; the other, an index of the total permit-value of residential building, begins in 1868. Both series suffer seriously from the very small size of Long's sample and from its restriction to larger cities. The number series starts with one city (Philadelphia), adds Manhattan and the Bronx in 1863, includes ten cities from 1883, and reaches its full complement of twenty-nine cities only in 1912. The permit-value sample starts with Manhattan alone, builds up to eleven cities in 1898, and finally includes twenty-seven cities from 1911 on. Both series are dominated by the behavior of building activity in the very largest cities, especially in the early years. Colean and Newcomb[13] consider that the small size and character of Long's sample combine to exaggerate the amplitude of the long waves. To the extent that the very largest cities of the late nineteenth century have grown more slowly than the urban or, more broadly, nonfarm community as a whole, Long's index also biases the trend of building downward and presumably exaggerates the amplitude of building downswings compared with upswings. It is sometimes said that the construction of Long's indexes adds to this bias because, though the composition of his sample changes, the year-to-year movements of his indexes are essentially those of a constant sample. They therefore exclude that part of urban growth

[13]*Stabilizing Construction* (12), Appendix N.

[14]Long's method was to aggregate the number, or value, of building permits for the sample of cities available in a given year, and to divide that sum by the average annual number, or value, of permits for the same cities in the eleven-year base period, 1920-30.

which stems from the appearance of communities whose size first qualifies them for inclusion in the urban sector.[14] This, however, is not a wholly valid point. For while one would wish to have estimates that reflect the growth of rural nonfarm building, it would distort the movement of the series to add to the measure each year the full stock of buildings in places which first acquire the characteristics of urban communities.

Gottlieb's new series, prepared for *Estimates of Residential Building* (20), is an attempt to construct a long-term series of the number of dwelling units built that is more nearly adequate in its level and trend than the Long and Blank-Official series, and that makes use of new data from Ohio to provide a more satisfactory foundation for a building index before the 1890's. Gottlieb has used the year-built data from the Housing Census of 1940 and other information in an attempt to improve the decade levels and interdecade movements of the Blank-Official series from 1900 to 1939. He has established the decade levels and, therefore, the trends of residential building activity from 1860 to 1909 by making use of newly compiled, complete data for Ohio. These he has projected to national levels on the basis of the combined showing of the relations between the number of occupied dwellings in Ohio and the nation and between the increments to the nonagricultural labor force in Ohio and the nation. For the period beginning 1890, Gottlieb uses the Blank-Official annual data to distribute his revised decade totals by years. Before 1890, he distributes his newly established decade totals by years by applying an average of three indexes: his own index of all newly built dwelling units in Ohio, Long's index of the number of residential permits, and the Riggleman index of the value of all urban building as revised by Isard and deflated by Riggleman's index of construction costs.[15]

PRIVATE NONRESIDENTIAL BUILDING

The series representing the other main branches of construction can be described more briefly than those representing residential building, partly because they are estimated more directly, partly because less is

[15]See below for a description of the Riggleman-Isard index. Its movements are heavily influenced by residential building, although it covers nonresidential building as well; and Gottlieb considers it a useful guide because its coverage is considerably greater than Long's and more widely representative geographically than the Ohio index.

known about their defects and biases, and partly because many of the problems they raise are analogous to those we have already met.

Private nonresidential building by convention includes all private building except that undertaken by nonfarm households, by railroads and other public utilities, and by farmers. It is dominated by factory and commercial building in various industries and trades, but it also includes building by private educational and religious agencies, as well as private social and recreational buildings, and private hospitals and other private institutions.

The basis for the Commerce-Labor series[16] in current prices (1915 to the present) is the F. W. Dodge Corporation series of contract awards. These are compiled by local reporting agents of the corporation who, in principle, report the award of all contracts within their area subject to a minimum size limit. The Dodge reports covered twenty-seven states in 1919. The coverage was increased to thirty-three states in 1923 and to thirty-seven in 1925. At first the states neglected were in the South and West, later in the West alone. Reports from the covered states were built up to national totals on the basis of comparisons between the Dodge reports and the national reports of the *Engineering News-Record* for large projects and by using permit information in the states not covered.[17]

The minimum size limits of the Dodge reports have varied between $500 and $10,000, but these variations are not considered to have seriously influenced the year-to-year comparability of the data.[18] The contract data not only neglect projects of low value, they also miss a certain amount of construction work performed by the regular staffs of companies in the mining and manufacturing industries or by day labor hired directly by such companies without the mediation of building contractors. Some contract work within the established limits may also be missed. On the basis of the relation between actual reported outlays and contract figures in various classifications, the Departments of Commerce and Labor have established raising ratios to allow for these various elements of undercoverage. Depending on the particular kind of

[16]See *Construction Volume and Costs,* and *Value of New Construction Put in Place* (44); and Chawner, *Construction Activity* (11), pp. 45-58.

[17]Since 1957, the Dodge Corporation reports cover all states.

[18]See *ibid.,* p. 47.

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building, contract awards are considered to account for between 80 and 90 per cent of the total. No one, however, knows how much the true ratios may change from year to year. Movement from year to year is, therefore, likely to be less accurate than that covering several years together.

Since 1919, the contract award figures are available separately for the various main branches of nonresidential building, and this makes it possible to correct for price changes by using various special-purpose price indexes.[19] Almost all the indexes, however, are in the nature of construction cost indexes, similar in kind to those employed to deflate the value of residential building; and the resulting estimates of the value of building in constant prices raise the same kinds of questions.

To extend this view of the behavior of nonresidential building back to the Civil War, two series prepared by Clarence Long are used.[20] One is an index of the number of nonresidential permits; the other, an index of permit-values. The coverage of these indexes is the same as that of his indexes of residential permits, and they are subject to the same reservations.

TRANSPORTATION AND OTHER PUBLIC UTILITIES CONSTRUCTION

For the years since 1915, we make use of the Commerce-Labor figures for all private public utility enterprises, including steam railroads. Government-owned utilities are consolidated with other government construction.

The Commerce-Labor data are an aggregate of separate estimates for steam railroads, transit companies, electric light and power companies, manufactured- and natural-gas companies, telephone companies, and telegraph and cable companies.[21] The data in current prices are based on company financial reports of capital expenditures beginning in various years from 1919 to 1922 depending on the industry. In some cases, for example, railroads, expenditures for land had to be excluded by estimate rather than by direct report. In other cases, for example, electric light and power companies construction expenditures had to be

[19]See *Construction Volume and Costs, 1915-1956* (44).

[20]*Building Cycles* (33), Appendix B.

[21]See Chawner, *Construction Activity* (11), pp. 61-70; and *Construction Volume and Cost* and *Value of New Construction Put in Place* (44).

separated from those for equipment by estimates. To this extent, construction expenditures are, in effect, given a pattern determined by the behavior of all capital expenditures for durables. Minor adjustments were sometimes required to allow for smaller companies. The financial-reports data were extrapolated to earlier years on the basis of various physical measures (e.g., new miles of track completed times a cost index, for railroads; and increase in generating capacity times a cost index, for electric light and power companies). Correction for price changes to yield estimates of construction in 1947-49 prices was carried out by methods similar to those already described; but in a number of cases, special indexes designed to represent the actual cost of constructing standard types of plant were available.

The Ulmer estimates of capital expenditures by all regulated industries give a certain view of the construction expenditures by these industries for the longer period, beginning in 1870. These figures are, by design, estimates of total gross capital expenditures for durables, that is, for plant and equipment, but excluding land. Hence, they distort the pattern of construction activity alone to the extent that expenditures for equipment and construction followed different paths. Actually, the long swings in these two branches of capital formation appear to have been generally similar in railroads; and it may be argued that the same is likely to have been true in other public utility enterprises, since much equipment is both very durable, very expensive per unit, and requires long periods to build. It therefore shares some of the important characteristics of immobile structures themselves. During the 1920's, plant and equipment expenditures were of about equal importance, but construction expenditures declined far more drastically than did those for equipment during the depression of the thirties. In earlier decades, construction was probably the more important of the two types of expenditure, at least in railroad investment, the chief component of capital expenditures.[22]

Ulmer's monograph[23] furnishes detailed descriptions of his esti-

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[22]Ulmer, *Capital in Transportation, Communications, and Public Utilities* (42), p. 223, n. 12, states that in the period prior to 1880, about 90 per cent of all capital expenditures of railroads were for road; between 1880 and 1917, about 70 per cent; and between 1917 and 1951, about 50 per cent or less.

[23]*Ibid.*, App. A through H.

mates. They are based on separate and detailed estimates for five major industries—steam railroads, electric light and power utilities, telephones, street and electric railways, and local bus lines. The sum of these is built up by approximation to include other minor regulated industries.

The figures for more recent decades are based on the financial reports of all or most individual companies, compiled by various official or private agencies. Such figures begin in 1912 for steam railroads, in 1913 for the telephone industry, and in 1921 or 1922 for the other industries studied in detail. Various minor adjustments were required to ensure comparability, to exclude land purchases, or to build up samples to complete coverage.

The figures for earlier years are far less reliable. The general method was to contrive benchmark estimates for particular years or groups of years and to interpolate estimates for individual years on the basis of various kinds of indirect indicators. Minor portions of the figures for limited periods represent no more than linear interpolations between benchmark values.

Although less reliable than the figures since World War I, the earlier estimates have a certain value as very rough approximations. The estimates for railroads and telephones have particular merit. For railroads, benchmarks were established at approximately three-year intervals on the basis of sample data for individual roads holding between 20 and 70 per cent of railroad physical assets. They were built up to United States totals by multiplying the value of total physical assets for railroads by the ratios of capital investment to assets for the sample roads. Annual data between benchmark years were interpolated on the basis of changes in miles of track operated, adjusted for changes in cost of construction. Minor adjustments were also required to exclude the cost of land. For the telephone industry, estimates of net capital expenditures are based on the year-to-year changes in the value of plant and equipment of the Bell System. Until 1893, the Bell System comprised the entire industry, and its figures needed to be adjusted only to exclude the value of the increase in land holdings. From 1894 to 1912, the Bell data for value of physical assets had to be raised to allow for non-Bell enterprises. This was done by finding the difference between the value of Bell assets in the census years, 1902, 1907, and 1912, and the value of total telephone assets. Annual values were then attained

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for non-Bell enterprises by interpolating along a straight line between census dates and extrapolating back from 1902 to 1893. The first differences in these figures, added to those for the Bell System, yielded net capital expenditures for the industry. The value of replacement expenditures was estimated by finding the average ratio of retirements to depreciation in the years 1913-17 and applying this ratio to the book values of plant and equipment. Between 1894 and 1912, the non-Bell firms accounted for about one-half of net capital expenditures. Their contribution to gross capital expenditure was smaller.

The figures for other regulated industries before World War I are less well founded. Railroads and telephones together, however, accounted for a very large part of capital expenditures by all regulated industries, almost 85 per cent in 1870, and over one-half as late as 1910, according to Ulmer's estimates. The method of constructing the estimates for the pre-World War I years makes it clear that they cannot be relied on as annual data. The benchmark data to which they are attached, however, are more secure; and this suggests that the estimates may be given greater credence in the form of moving averages. Ulmer shows that figures built up by his methods of approximation, and smoothed by nine-year moving averages, behave very much like nine-year moving averages of the more reliable figures available after 1920.

Ulmer translates his figures in current prices into estimates in constant prices by indexes of much the same quality and character as those used by the Departments of Commerce and Labor for their data since 1915.

The various value series in this sector are bolstered by three series expressed in physical units: rail consumption, increase in telegraph wire mileage, and increase in telephone wire mileage. The figures for rail consumption include both iron and steel rails. They consist of production figures adjusted for imports before 1872 and for both imports and exports thereafter. They fail to represent rails laid down in any given period to the extent that rail inventories may have changed, but these changes would rarely be important and then only for short periods. They are presumably better indexes of construction in the earlier decades of railroading than later, when the ratio of expenditures for other elements of construction had increased relative to track-laying. For analogous reasons, increase in the wire mileage operated by the Western Union Telegraph Company and by the telephone industry

give incomplete but still valuable pictures of construction in their industries.

<div align="center">FARM CONSTRUCTION</div>

The Commerce-Labor estimates of expenditures on farm buildings are a product of the Agricultural Marketing Service of the Department of Agriculture.[24] They are based chiefly on sample surveys for 1934-37, 1939, 1946, and 1949. Estimates for other years are obtained by interpolation and extrapolation guided by estimates of lumber consumption on farms, sales of building materials on farms, nonfarm residential building, information about farm electric lighting systems, silos and other special equipment, and building costs.

<div align="center">SHIPBUILDING</div>

This series represents the gross tonnage of merchant vessels built and documented in the United States. "Undocumented craft are those not registered, enrolled or licensed. Barges, scows, lighters, and canal boats, without any propelling power of their own, operated exclusively in a harbor, on the canals or internal waters of a State, or on the rivers and lakes of the United States, not in any case carrying passengers, and vessels under 5 net tons are exempt from the requirements of the laws governing documentation" [*Historical Statistics* (45), p. 439]. The figures beginning in 1938 are not entirely comparable with the earlier data, since the latter represent only those vessels built during a twelve-month period which were still "existent and documented as part of the merchant fleet at the end of the period. Hence, they exclude vessels completed during the period which were lost, sold to U.S. Government, sold to aliens, or otherwise removed from merchant vessel documentation before the end of the period" (*ibid.*, p. 441). The early years of our series are transcribed from *Historical Statistics, 1789-1945* (45), which describes the underlying official sources.

<div align="center">PUBLIC CONSTRUCTION</div>

The Commerce-Labor series of expenditures for public construction is available for the years since 1915 and is a total of the value of state and local and of federal projects. Estimates of state and local government construction projects, which are based upon Dodge Corporation

[24]See *Construction Value and Costs, 1915-1956* (44), p. 88.

contract awards data for the states east of the Rocky Mountains, are therefore subject to the same limitations as those for private nonresidential building. Estimates for states not covered by the Dodge series are based on building permit data and correspondence with state and local officials. To avoid duplication, federally aided projects are removed from the Dodge data and covered among the federal projects. Since these figures represent the value of work about to be started, allowance must be made for the normal patterns of delay and of expenditure of funds in order to obtain a series representing the value of work put in place.

Estimates of the value of work put in place on federal projects are, in the main, based on the progress reports of the federal agencies in charge of the construction work or of the expenditure of funds. These are supplemented by information about contract awards compiled by the Dodge Corporation.

Long's index of the permit-value of public building in fourteen cities provides a longer view of the course of public construction. It is, however, an inadequate view on several counts. Much construction on governmental account takes place outside the bounds of communities requiring building permits. Even within those bounds, some unknown volume of public building is exempt from authorization by permit. Finally, the coverage of the public building index is even more restricted than that of the other Long indexes already described. The series is, therefore, of uncertain value.

TOTAL URBAN BUILDING

The ingredients and method of construction of two of the series under this head, Long's indexes of the number of permits in twenty-nine cities and of the value of permits in twenty-seven cities have already been described. They comprehend all the permits issue in his sample cities and include those for alterations and public buildings as well as those for private residential and nonresident use.

The two Riggleman series are also indexes of the total value of building permits in urban communities.[25] The coverage of the series

[25] See Riggleman's dissertation, "Variation in Building Activity" (39), which is the source of our data. See also his article, "Building Cycles in the United States" in which his index appears in preliminary form; and Colean and Newcomb, *Stabilizing Construction* (12), Appendix N, which provides details of the construction of Riggleman's series and a critical commentary on his results.

during the period with which we are concerned varies from five cities in 1855 to sixty-five cities from 1900 on. Manhattan building dominates the index until 1870 and is perhaps unduly important for some years after. By 1880, the cities included account for 39 per cent of the urban population, by 1890, for 43 per cent, and since 1900, for approximately 50 per cent.

The index of the value of permits per capita in current prices was constructed by aggregating the permit-values for all the cities covered in a given year and then dividing by an estimate of their population. The "adjusted" index makes two further modifications. It allows for changes in building costs, as shown by an index of building materials prices and building labor wage rates, and for secular trend.

Even in its unadjusted form, the Riggleman index eliminates much of the secular trend in building, since it does nothing to reflect the growing number of urban and suburban communities, and removes the effect of population growth within the covered cities. Isard's modification of the Riggleman index is an attempt to restore the element of population growth within the covered cities. He eliminates Riggleman's population adjustment, expresses the permit-values in the covered cities as relatives of their average standing in the decade 1920-29, and combines the relatives by weights proportional to activity in each city in the base period. He thus achieves an index similar in construction to Long's but with wider coverage in the earlier years.

Colean and Newcomb, comparing the Riggleman and Long indexes with the Commerce-Labor estimates of the value of total construction activity since 1915, concluded that the two earlier indexes exaggerated the amplitude of the long swings in building.[26] They attribute the difference to the greater weight that residential building implicitly has in the Long and (presumably) Riggleman series than it actually had in the decades for which comparisons are possible and also to the more erratic fluctuation of permits compared with expenditures. Colean and Newcomb, therefore, build up a new series as follows: (1) They smooth the Riggleman series, as adjusted by Isard, by means of a three-year moving average, and allow it to represent building until 1878. (2) They reweight the various elements in Long's index, so that

[26] It should be noted, however, that Colean and Newcomb compared Riggleman's and Long's figures with Commerce-Labor data representing total construction, not urban building alone.

residential building has a weight of only one-third instead of one-half. Then they smooth the modified index by taking a three-year moving average, and use the resulting figures to extend the Riggleman series to 1915. (3) Finally, they move the series forward on the basis of the Commerce-Labor estimates of the value of total new construction (see below). The final outcome may be thought of as an index of total urban building until 1915, and thereafter, as an index of aggregate construction. As an index of urban building, the weight given residential building may now be too low for the earlier decades covered by the series. To eliminate the effect of price changes, the Colean-Newcomb figures for the years through 1933 have been divided by Riggleman's index of building costs.

AGGREGATE CONSTRUCTION

The most nearly adequate series representing the aggregate of all construction activity in the United States are those prepared by the Departments of Commerce and Labor for the years since 1915. For total new construction in current prices and in 1947-49 prices. These series are simply the sum totals of estimates prepared for the various sectors, and previous sections of this appendix have already described the bases on which the estimates for the major sectors rest and some of their limitations.

These two series cover the value of work put in place on new immobile structures. They exclude a measure of new ships, for which a series has been included in our collection, but they do include alterations of, and additions to, existing structures. The series representing new construction exclude the value of maintenance and repair work. Such work, since it involves many of the same kinds of materials and labor, is sometimes treated as a part of construction. The Departments of Commerce and Labor prepare an estimate of the value of such work, and we have included a series showing the aggregate value of construction including repairs and maintenance. The figures are available only in current prices. The estimated value of repairs and maintenance is approximately one-quarter of the value of construction activity including repairs and maintenance.

The estimates of repair and maintenance work are built up by a variety of methods, depending on the sector. The figures rest on indirect estimates to a much greater degree than do those for new construction

and are considered to be less reliable. The data for public utilities and for the maintenance of federal government structures and installations depend on the financial reports of the agencies themselves and reflect records of current expenditures. For residential buildings, however (which account for over one-third of maintenance expenditures), the figures for most of the period are based on the application of constant factors to estimates of the value of the stock of residential buildings. The same is true, for a large part of the period, for the industrial and commercial sectors of private nonresidential buildings.[27] For more recent years, however, the estimates in these categories have been improved by employing figures from tax returns in the industrial category. Current issues of the Department of Commerce publication, *Construction Review,* provide more detailed descriptions of current practice.

Simon Kuznets, in *Capital in the American Economy* (27), has provided estimates of total new construction in both current and constant prices beginning in 1869. These depend on the Commerce-Labor series for aggregate new construction from 1915 on, but before that date, they are Kuznets' own estimates. The scope of the Kuznets figures is slightly wider than that of the Commerce-Labor series in that Kuznets has included oil-well drilling in his figures and provided estimates for this activity throughout.

For the period 1869-1914, in which his series depend on his own estimates, Kuznets' figures for total new construction follow a pattern determined by the flow of construction materials destined for domestic consumption. His procedure involves the following steps:

1. Kuznets adopts William H. Shaw's estimates of the value of construction materials destined for domestic consumption (i.e., the sum of production in the United States plus net imports) valued at producers' current prices and at producers' prices of 1913. These estimates, given in *Value of Commodity Output* (40), consist of figures at the decennial census dates 1869, 1879, and 1889, and annually thereafter. Shaw's annual data from 1889 on consist of interpolations between census benchmark figures available at five-year intervals from 1889 to 1913. His interpolations are based on the showing of a relatively few state censuses of manufacturing available at shorter intervals than five years, supplemented by figures for several important construction materials

27See Chawner, *Construction Activity* (11), pp. 21-22.

available annually. Kuznets himself provides annual estimates for 1870-78 and 1880-88 by interpolating between Shaw's decennial figures. For 1869-79, Kuznets forms an interpolating index on the basis of the output of nails, rails, and lumber. For 1879-89, he combines these commodities with cement and roofing slate. The various series are combined by weights which are approximations to their value of output in 1869, 1879, and 1889.

2. After adjusting the constant-price series to 1929 levels, Kuznets makes the following adjustments.

a. He raises the figures of construction materials destined for domestic consumption from producers' prices to value at the construction site by applying the constant factor 1.4576, an estimate of the relation in 1929. This adjustment presumably allows for transportation charges and distributors' markups.

b. He next subtracts inventory accumulation, estimated as the net change in output of construction materials multiplied by 0.4554 (the ratio of the estimated net change in inventories to the net change in ouput in the years 1919-28), to obtain estimates of the flow of construction materials into consumption at consumers' 1929 prices.

c. The flow of materials into consumption is next raised by the factor 1.54056, an estimate of the ratio of the value of new construction in 1919-33 to the cost of construction materials consumed.

d. To move from the value of new construction in 1929 prices to that in current prices, Kuznets multiplies the former by an annual index of construction costs. This is a weighted average of prices of construction materials and wage rates in construction in each year expressed as a relative of the weighted average cost in 1929.

The volume of building materials destined for domestic consumption is, in general, a useful guide to the fluctuations in the output of the construction industry. A comparison of the Commerce-Labor estimate of total new construction with a series representing consumption of building materials for the years since 1920, when both are available, shows that the two behave in remarkably similar fashion. The amplitude of fluctuation of building materials is, indeed, somewhat smaller than that of construction itself, but that difference is consistent with the true nature of the two series. Although the Kuznets series is, in principle, supposed to represent new construction (the raising ratio

applied to cost of materials consumed is the ratio of the value of new construction to cost of materials), a considerable proportion of building materials is used for repair and maintenance. Since fluctuations in repair and maintenance activity are smaller than those in new building activity, estimates of construction based on materials consumed are likely to fluctuate less violently than new construction itself.

Another general characteristic of the Kuznets estimates is that they make no allowance for changes in the ratio of the output of the construction industry to cost of materials consumed, that is, in the value added in construction per dollar of materials consumed. One might plausibly entertain the hypothesis that when the demand for new structures is especially high, value added per dollar of materials will also be high, partly because structures will then be more lavishly designed, partly because builders' profit margins will be high. If this hypothesis were valid it would be another reason to expect new construction to fluctuate more than materials consumed and more, therefore, than Kuznets' estimates. Fluctuations in the composition of structures by type, by region, and by size of community would also influence the result. There is no direct evidence on these points, however, and any conclusion remains purely speculative.

The generally satisfactory performance of materials consumed as a proxy for construction output during the period since 1920 cannot be treated as an unqualified test of the adequacy of the Kuznets series before 1915 (still less before 1890) for the following reasons:

1. In the later period, census benchmarks of materials output were generally available biennially or, in the form of Census Surveys, more frequently. From 1890 to 1915, however, the census of manufactures was taken only every five years and before that time, only every ten years.

2. The bases for interpolation between census dates also improved with time and were strikingly better after 1890 than before. The few products available for interpolation before 1890 represented some 45 per cent of the value of materials consumed. However, the interpolators themselves were not perfectly adequate representatives of the products they represented.

3. It appears that between 1870 and 1915 the cost of transporting

and distributing building materials gradually declined. The application of a constant markup to allow for these costs, therefore, gives the trend of the Kuznets estimates a small upward bias, which was more marked in the period before 1890 than after.[28] The effect, of course, would be to exaggerate the upsurges and to understate the declines in construction.

4. The same type of bias is presumably injected into the Kuznets estimates because the coverage of the Censuses was improving, and because the output of materials was becoming more nearly completely commercialized. Both forces were presumably operating more strongly in the earlier than in the later decades.

5. It appears that the coverage of the 1869 Census of Manufactures was especially deficient compared with the 1879 Census. Kuznets cites the opinions of William H. Shaw and Francis A. Walker that the relative undercoverage of the 1869 Census was between 5 and 13 per cent.[29] These biases are incorporated into Kuznets' estimates of national income and GNP as well as of construction. Milton Friedman has attempted to approach the problem through the supply of money and its income velocity.[30] According to Friedman's calculations, the understatement in the 1869 figures relative to the 1879 figures was 22 per cent. Friedman also suggests that the error arises partly from an understatement of the 1869 level, and an overstatement of the 1879 level compared with the 1889 level. None of these estimates, however, applies specifically to the output of construction materials, for which the relative understatement is presumably not the same as for the total output of commodities or for national income. Subject to this qualification, they suggest that the surprising rise in construction shown by Kuznets' figures in the 1870's exaggerates the true rise—if indeed there was any— during the decade and understates the upsurge of the 1880's.

The various weaknesses of the Kuznets series for the period in which it depends on consumption of raw materials impelled us to try to construct aggregate indexes for the period from about 1870 to 1918 on the basis of existing series measuring construction activity or some closely related variable, such as permits or contracts. Actually, we have been

[28]See Kuznets, *Capital in the American Economy* (27), App. B.

[29]*National Product since 1869* (29), pp. 34-38.

[30]"Monetary Data and National Income Estimates" (18), pp. 273-282.

able to contrive such series to cover a combination of urban residential building, urban nonresidential building excluding that by governmental bodies,[31] and railroad and public utilities construction. These categories accounted for approximately 75 to 80 per cent of total construction during the period. Series with this coverage have been compiled in three variants: (1) as an index of the value of construction measured in current prices; (2) as an index of the value of construction measured in constant prices; and (3) as an index of the volume of construction on the basis of series expressed in physical units. We refer to these series as NBER indexes of urban building and public utilities construction.

Each variant of this index has been divided into two overlapping segments in order to take advantage of more reliable and more comprehensive data in the period after 1889. The composition of the three variants is as follows:

1. *Index of value in current prices.*
    a. Segment I, 1870-97: *urban residential and urban nonresidential*—Riggleman-Isard index of value of building permits; *railroad and public utility*—gross capital expenditures by railroads, Ulmer.
    b. Segment II, 1889-1918: *urban residential*—expenditures for new nonfarm dwelling units, Blank; *urban nonresidential*—Long's index of the value of all nonresidential building permits; *railroad and public utility*—gross capital expenditures by all regulated industries, Ulmer.

2. *Index of value in constant prices.*
    a. Segment I, 1870-97: *urban residential and urban nonresidential*—Riggleman-Isard index of value of building permits, corrected for price changes; *railroad and public utility*—gross capital expenditures by railroads in 1929 prices, Ulmer.
    b. Segment II, 1889-1918: *urban residential*—expenditures for new nonfarm dwelling units in 1929 prices; *urban nonresidential*—Long's index of the value of all nonresidential building permits, corrected for price changes; *railroad and public utility*—gross capital expenditures by all regulated industries in 1929 prices, Ulmer.

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[31]Public building is excluded in principal because we depend on permit data, and some unknown fraction of public building is exempt from permit. In two variants, however, an adjusted form of the Riggleman index is used which includes permits for public buildings insofar as they were issued in the cities he covered.

3. *Index of physical volume.*

a. Segment I, 1856-97: *urban residential*—Long's index of the number of all residential building permits; *urban nonresidential*—Long's index of the number of all nonresidential building permits; *railroad and public utility*—rail consumption.

b. Segment II, 1889-1918: *urban residential*—new nonfarm dwelling units started, Blank; *urban nonresidential*—see Segment I; *railroad and public utility*—See Segment I.

A few comments are needed to explain some of the choices involved in selecting the components of the several variants.

It would have been possible to use separate series to represent residential and nonresidential building in Segment I of the first two variants, but to do so we would have had to rely on Long's series. These, however, have a smaller coverage than does Riggleman's series; and the latter, after adjustment by Isard to reflect population growth, seems the better choice. Riggleman's series, it should be noted, includes an unknown, and presumably changing, volume of public building.

Public utilities other than railroads are not represented in Segment I of any of the variants because the available data are unsatisfactory. In this period, however, railroad expenditures were perhaps three times as great on the average as those of other public utilities.

Railroad and public utility construction are represented in Segment II of the first two variants by estimates of all capital expenditures in these sectors. These estimates have an unduly wide scope in that they include expenditures for equipment. The alternative would have been a series on railroad building alone. This would have neglected other public utilities entirely at a time when their importance began to approach that of railroads. Moreover, there are strong indications that expenditures for plant and equipment have moved in quite similar fashion, at least in the railroad industry. Nevertheless, in the third variant, we had to resort to the less desirable alternative, because only for railroads was there a relatively satisfactory series expressed in physical units.

To combine the several components, we employed weights representing the approximate relative importance of the sectors included in each of the two segments. There is, unfortunately, no way to determine the importance of the different sectors in each segment, for there are no direct reports on the value of total construction or on the major

sectors for the period covered by the index.

There are two sources of evidence that can be used to obtain approximations.

First, Kuznets' estimates of total construction, broken down into nonfarm residential, government, and all other.[32] The chief value of these figures for the present purpose is that they provide an estimate of the relative importance of nonfarm residential building. Since this is the closest we can come to a direct estimate for this component, and since the results it yields are not far different from those yielded by the source below, we rely on it. It is not, however, really accurate, since Kuznets' estimate of total construction is built up from estimates of construction materials by applying constant factors to the cost of materials consumed to allow for value added in construction and to exclude the proportion accounted for by repairs and maintenance. Further, the level of Kuznets' figures for residential building is estimated even in the second segment, where Kuznets relies on Blank's estimates. Before that date, the Kuznets residential series is extrapolated backward on a more precarious basis. The share of nonfarm residential in total gross construction suggested by these data are shown in Table A-4.

Second, in *National Product since 1869* (30), Kuznets presents figures for the value of real estate improvements in 1929 prices broken down in considerable detail for the following dates: 1880, 1890, 1900, 1912, and 1922. These are based chiefly on deflated *Census of Wealth* data for value of real estate with allowances for the value of land. An estimate of gross construction for the detailed components and, therefore, for the total, can be obtained from these figures as follows:

1. Treat the differences between values of real estate improvements in constant prices as estimates of the cumulative value of *net* construction for the intervening periods.

2. Make an estimate of depreciation by multiplying the average value of the stock of real estate improvements in successive periods by ratios representing rates of depreciation. The average values of real estate improvements were approximated by computing averages of the values of such improvements at the terminal dates of successive periods. Depreciation rates were obtained by making use of information on the

[32]In principle the Kuznets figures for nonfarm residential building, like those of Blank referred to earlier, exclude nonhousekeeping units.

TABLE A-4

SHARE OF NONFARM RESIDENTIAL CONSTRUCTION IN
GROSS NEW CONSTRUCTION, 1869-1918
(per cent)

	Based on Values in	
	Current Prices	1929 Prices
1869-78	31.4	35.3
1879-88	40.2	45.2
1889-98	34.9	38.8
1899-1908	27.6	29.5
1909-18	25.9	28.2
Weighted averages		
1869-98	35.9	40.1
1889-1918	28.4	31.5

Source: Calculated from Kuznets, Capital in the American Economy (27), Tables R-14, R-15, and R-30.

average life of structures in different industries gleaned from Goldsmith's *A Study of Saving* (19).

3. Sum the estimates for net construction and depreciation to obtain estimates of gross construction.

The results of these calculations are shown in Table A-5.

The estimates of national wealth and of real estate improvements based on them are imperfect in many substantial respects. The reader should consult Kuznets' book for a critical discussion of the figures. In general, the estimates of gross construction based on the wealth figures adjusted for depreciation lie below Kuznets' estimates of gross construction derived by blowing up the cost of construction materials consumed. Indeed, the differences are very large for the period 1912 to 1922—presumably because the great price fluctuations in this period made it impossible to reduce the wealth estimates even crudely to a constant-price basis. We have made no use of estimates based on wealth data for this period. For earlier years, there is some reasonable ground

TABLE A-5

DISTRIBUTION OF GROSS NEW CONSTRUCTION BY TYPE, BASED ON WEALTH ESTIMATES,
1880-1912

	Percentage Shares in Total New Construction				
	1880-90	1890-1900	1900-12	1880-1900	1890-1912
Agriculture	9.4	10.9	10.6	10.2	10.7
Mining	1.0	1.3	1.2	1.2	1.2
Manufacturing and other industrial	18.8	16.3	17.6	17.5	17.0
Residential	37.0	31.8	34.9	34.4	33.3
Tax-exempt	5.6	8.0	7.6	6.8	7.8
Steam railroad	24.3	19.3	14.7	21.8	17.0
Other public utility	4.0	12.4	13.5	8.2	12.9

Source: See accompanying text.

for relying on the wealth data, since the shares for residential construction and for tax-exempt building they yield are not widely different from those yielded by Kuznets' direct estimates for residential and government construction. Since only crude orders of magnitude of the relative importance of the various components were sought, the indications yielded by the estimates derived from the wealth data seem to be valuable and, in any case, better than could be obtained in any other way.

To use these two sets of data to obtain weights for the index, we began with the share of nonfarm residential construction suggested by Kuznets' direct estimates of construction. We rounded the average share ˈsuggested by these data for 1869-98 and 1888-1918, respectively, to obtain figures to represent the relative share of this component in the first and second segments of each variant (see Table A-6, upper frame). The other percentage shares are based on the showing of the estimates derived from the wealth data. To obtain them we treat the averages

for 1880-1900 as applying to the first segment and those for 1890-1912 as applying to the second segment. Since the residential share we adopt is somewhat higher than the residential share yielded by the wealth data, this suggests that we ought to reduce the indicated shares of the other components by perhaps 10 per cent of their own levels, that is, by two or three percentage points. We have, nevertheless, accepted the figures as they stand, except for rounding. In part, this is because we do not know how the errors are distributed among the various categories. There is, in addition, a countervailing consideration in the case of the share of "manufacturing and other industrial" construction. Our ultimate objective is a figure to represent the relative importance of urban nonresidential building. This should include building for private hospitals, schools, recreational, and other philanthropic organizations, all of which are included in the tax-exempt category in the wealth estimates. To allow for these various considerations, we have entered the share for nonresidential construction at figures somewhat higher than those indicated for "manufacturing and other industrial" in the table based on the wealth estimates. And we have entered the shares for railroad and other public utility construction at figures somewhat lower.

Since the weights finally adopted (see Table A-6, bottom frame) are supposed to represent the relative importance of the various components, on the average, during the entire period covered by each segment, each component was first expressed as a series of relatives of the average standing of the given series for the period covered by the segment. A weighted average of relatives was then constructed, the weights being the shares referred to above. In the first segment, the Riggleman-Isard index of urban building permits was assigned the combined shares for residential and for nonresidential building.

The only indications of the relative importance of any of the categories in the index measured in current prices are afforded by Kuznets' estimates of total gross construction and of nonfarm residential construction. In current prices, the share of residential construction is a few percentage points smaller than in constant prices. Since the difference is small, however, and since there were no indications of the weight of other categories in current prices, the same weights were employed to compute all three variants of the index.

The value of the NBER indexes is manifestly no greater than that of the component series from which they were formed. As earlier sec-

TABLE A-6

DERIVATION OF WEIGHTS FOR COMPONENTS OF NBER INDEXES OF URBAN BUILDING
AND PUBLIC UTILITIES CONSTRUCTION
(per cent)

		Segment II	
	Segment I	Including Railroad and Other Public Utility	Including Railroad and Excluding Other Public Utility
A. APPROXIMATE SHARES IN TOTAL NEW CONSTRUCTION OF SECTORS INCLUDED IN THE INDEXES			
Nonfarm residential	40	32	32
Urban nonresidential	18	18	18
Railroad	20		16
Railroad and other public utility		28	
Total of sectors included	78	78	66
B. WEIGHTS CALCULATED FROM A			
Nonfarm residential	51	41	49
Urban nonresidential	23	23	27
Railroad	26		24
Railroad and other public utility		36	
Total	100	100	100

tions of this appendix have pointed out, many of these series are sub-
ject to serious weaknesses. Insofar as the weights used to combine them
are imperfect, this constitutes an additional source of error. Finally, the
aggregate represented by the index excludes public building and other
sectors which account for from 20 to 35 per cent of total construction,
depending on the form of the index and the segment considered.[33] On
the other hand, the indexes do cover the bulk of all construction activity.
Moreover, they measure such activity in a variety of ways and so con-
stitute useful checks on the evidence provided by Kuznets' estimates
before 1915.

[33]In Segment I, however, public building in urban areas, if subject to permit,
is represented in the Riggleman-Isard index.