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APPENDIX C

Sources of Data

THIS APPENDIX lists sources of data, so far as they are not already given in the text. Explanatory notes are occasionally added. Their main purpose is to help the interested reader identify the particular series we have used.

Chapter 3

Chart 3

(1) INDEX OF INDUSTRIAL PRODUCTION

Through 1939, Board of Governors of the Federal Reserve System, *New Federal Reserve Index of Industrial Production* (published apparently at the end of 1941), pp. 23, 29. Since 1940, *Federal Reserve Bulletin*, Aug. 1943, p. 773. (For revised data starting 1939, see *ibid.*, Oct. 1943, p. 964.)

(2) TON-MILES OF FREIGHT HAULED

Nonrevenue ton-miles included. Derived from publications of the Interstate Commerce Commission. Through 1922, *Statistics of Railways*, 1922, p. XCV. For 1923-34, *Freight and Passenger Service Operating Statistics of Class I Steam Railways*. Since 1935, *Freight Train Performance of Class I Steam Railways*. Seasonal removed by the National Bureau.

(3) DEPARTMENT STORE SALES

Federal Reserve Bulletin, Aug. 1936, p. 631; Feb. 1938, p. 160; Jan. 1941, p. 65; April 1942, p. 372. (For revised data, see *ibid.*, June 1944.)

Chapter 4

Chart 7

Some of the titles on the chart are abbreviated here.

(1) MILK USED IN FACTORY PRODUCTION

Through 1941, furnished by Bureau of Foreign and Domestic Commerce. For 1942, *Survey of Current Business*, March 1943, p. S-25. (Slightly revised figures, starting in 1920, may be obtained from the Bureau of Foreign and Domestic Commerce.)

(2) TRANSIT RIDES, NEW YORK CITY

Bus rides, which constituted 3 per cent of total transit rides in 1927, are excluded before 1927. Traffic of Hudson and Manhattan Railroad Company is excluded throughout. In general, the data come from the *Annual Report of the Transit Commission* (prior to 1920, Public Service Commission, First District), State of New York. Figures on subway and streetcar rides in 1941-42, and bus rides in 1927-42, furnished by Transit Commission.

- (3) **RAILWAY PASSENGER-MILES, COMMUTATION**
Interstate Commerce Commission, *Revenue Traffic Statistics of Class I Steam Railways*.
- (4) **WHOLESALE PRICE OF SULPHURIC ACID**
From publications of the Bureau of Labor Statistics: through 1931, various issues of the *Bulletin*; since 1932, *Wholesale Prices*.
- (5) **WHOLESALE PRICE OF SHOES**
Through Sept. 1931, *Bulletin* of the Bureau of Labor Statistics, various issues. For 1931-42, furnished by Bureau of Labor Statistics. The figures of the first segment run higher than the figures of the second. Hence the figures of the second segment, starting Oct. 1931, were raised by 1.026, which is the average ratio of the old to the new series during Jan.-Sept. 1931.
- (6) **WHEAT FREIGHT RATES, CHICAGO TO NEW YORK**
Average daily rate during month. Basic data through 1934, furnished by Chicago Board of Trade. Since 1935, Chicago Board of Trade, *Annual Report*.

Chart 8 and Tables 18-19

All series are adjusted for seasonal variations, except (4)-(5), (33)-(34), (38)-(40). The following series have been adjusted by the National Bureau: (3), (8), (10), (20)-(22), (26)-(30), (35)-(37), also component (b) of (23)-(25).

- (1) **TOTAL INCOME PAYMENTS**
For 1932-38, furnished by Bureau of Foreign and Domestic Commerce. For 1939, *Survey of Current Business*, March 1943, p. 27. For revised data in 1939, see *ibid.*, April 1944.
- (2) **TOTAL CIVIL NONAGRICULTURAL EMPLOYMENT**
Self-employed persons, casual workers, and domestic servants excluded. *Federal Reserve Bulletin*, June 1941, pp. 534-5.
- (3) **BANK DEBITS OUTSIDE N.Y. CITY**
Survey of Current Business, 1936 Supplement, p. 44; June 1933, p. 30; 1938 Supplement, p. 53; 1940 Supplement, p. 48.
- (4) **INDEX OF WHOLESALE PRICES**
Bureau of Labor Statistics, *Wholesale Prices*, Dec. issues.
- (5) **INDEX OF COST OF LIVING**
National Industrial Conference Board index. *Survey of Current Business*, Dec. 1936, p. 19; Jan. 1941, p. 18.
- (6) **RETAIL SALES**
Sales by department stores, chain and independent grocery stores, automobile dealers, restaurants, service stations, and other retail outlets. Estimates furnished by V. Lewis Bassie, War Production Board.
- (7) **DEPARTMENT STORE SALES**
See this appendix, note on series (3) of Chart 3.
- (8) **CHAIN STORE SALES**
Survey of Current Business, 1936 Supplement, p. 25; 1940 Supplement, p. 27.
- (9) **FREIGHT CAR LOADINGS**
Federal Reserve Bulletin, June 1941, pp. 532-3. See p. 529 for description.
- (10) **ELECTRIC POWER PRODUCTION**
Survey of Current Business, Dec. 1940, p. 17.
- (11) **TOTAL INDUSTRIAL PRODUCTION (F.R. BOARD)**
See this appendix, note on series (1) of Chart 3.

- (12) **TOTAL INDUSTRIAL PRODUCTION (S.S.Co.)**
From publications of Standard Statistics Company. Through 1936, *Standard Trade and Securities: Basic Statistics*, April 29, 1938, Sec. D, p. 67. Since 1937, *Standard Trade and Securities: Current Statistics*, Dec. 1939, p. 13; Dec. 1940, p. 13.
- (13) **PRODUCTION OF DURABLE MANUFACTURES**
Board of Governors of the Federal Reserve System, *New Federal Reserve Index of Industrial Production* (published apparently at the end of 1941), pp. 30, 45, 82. (For revised data, starting 1939, see *Federal Reserve Bulletin*, Oct. 1943.)
- (14) **PRODUCTION OF NONDURABLE MANUFACTURES**
Same as (13).
- (15) **PRODUCTION OF MINERALS**
Same as (13).
- (16) **PRODUCTION OF PRODUCERS' DURABLE GOODS**
Federal Reserve Bank of New York index; furnished by that agency. Adjusted for secular trend. Data reflect revisions as of Jan. 1942. See description in *Journal of the American Statistical Association*, June 1938, pp. 341-8; Sept. 1941, pp. 423-5.
- (17) **PRODUCTION OF CONSUMERS' DURABLE GOODS**
Same as (16).
- (18) **PRODUCTION OF PRODUCERS' NONDURABLE GOODS**
Same as (16).
- (19) **PRODUCTION OF CONSUMERS' NONDURABLE GOODS**
Same as (16).
- (20) **PAYROLLS IN MANUFACTURING**
Bureau of Labor Statistics index. *Survey of Current Business*, Dec. 1938, p. 16; Oct. 1939, p. 17; 1942 Supplement, pp. 48, 50.
- (21) **PAYROLLS, DURABLE MANUFACTURES**
Same as (20).
- (22) **PAYROLLS, NONDURABLE MANUFACTURES**
Same as (20).
- (23) **MAN-HOURS WORKED IN MANUFACTURING**
Derived by multiplying seasonally adjusted figures of two series: (a) index of factory employment (*Survey of Current Business*, Dec. 1938, p. 15; Oct. 1939, p. 17; March 1941, p. 18) and (b) average hours worked per week (Bureau of Labor Statistics, "Hours and Earnings in the United States, 1932-40", *Bulletin 697*, pp. 48-9, 156).
- (24) **MAN-HOURS WORKED, DURABLE MANUFACTURES**
Same as (23).
- (25) **MAN-HOURS WORKED, NONDURABLE MANUFACTURES**
Same as (23).
- (26) **AVERAGE HOURLY EARNINGS IN MANUFACTURING**
Same as (23), series (b).
- (27) **TOTAL IMPORTS**
General imports. Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce*.
- (28) **TOTAL EXPORTS**
Re-exports of foreign merchandise included. Same as (27).

- (29) **TOTAL CONSTRUCTION CONTRACTS**
Value of contracts in 37 states, reported by F. W. Dodge Corporation. *Survey of Current Business*. 1936 Supplement, p. 16; 1940 Supplement, p. 16.
- (30) **PRIVATE CONSTRUCTION CONTRACTS**
Value of contracts in 37 states, on account of private owners, reported by F. W. Dodge Corporation. *Ibid.*, Aug. 1937, p. 18; 1940 Supplement, p. 16.
- (31) **ORDERS FOR MANUFACTURED GOODS**
Index of value of new orders, by National Industrial Conference Board. C. L. Rogers, "Inventories, Shipments, Orders, 1929-1940: Revised Indexes", *The Conference Board Economic Record*, Vol. II, Supplement, Dec. 26, 1940, pp. 3, 7.
- (32) **INVENTORIES HELD BY MANUFACTURERS**
Index of value of inventories. Same as (31).
- (33) **INDUSTRIAL COMMON STOCK PRICES**
Index of prices of 354 stocks. Standard and Poor's Corporation, *Trade and Securities Statistics: Long Term Security Price Index Record*, p. 7; see description on pp. 3-4. (The issue cited is Vol. 96, No. 9, Sec. 2 of the Corporation's publications.)
- (34) **CORPORATE BOND PRICES**
Same as (40), but inverted.
- (35) **NUMBER OF BUSINESS FAILURES**
Data represent 'all commercial' failures. Through 1933, *Dun's Review*, Jan. 1935, p. 18. Since 1934, *Dun's Statistical Review*, Feb. 1940, p. 14; these figures are not strictly comparable with earlier data.
- (36) **NEW CORPORATE CAPITAL ISSUES**
Domestic issues, dollar value, compiled by *Commercial and Financial Chronicle*. Reported in *Survey of Current Business*, Feb. 1938, pp. 18, 20; 1940 Supplement, p. 68; 1942 Supplement, p. 80.
- (37) **LOANS OF REPORTING MEMBER BANKS**
From reporting member banks in 101 cities. Derived from *Federal Reserve Bulletin*, Feb. 1933, p. 75; Dec. 1935, pp. 806, 876; and later issues.
- (38) **NET DEMAND DEPOSITS OF MEMBER BANKS**
All member banks. Through 1937, Board of Governors of the Federal Reserve System, *Annual Report*. Since 1938, *Federal Reserve Bulletin*.
- (39) **COMMERCIAL PAPER RATES**
Through Jan. 1937, Frederick R. Macaulay, *Interest Rates, Bond Yields and Stock Prices*, Appendix A, Table 10, col. 3, pp. A160-1. Since Feb. 1937, *Bank and Quotation Record*. See Macaulay, pp. A335-51, for description.
- (40) **YIELD OF CORPORATE BONDS**
Moody's 120 domestic bonds. Reported in *Survey of Current Business*, Nov. 1937, p. 19; 1940 Supplement, p. 73.

Chart 9

All series have been adjusted for seasonal variations by the National Bureau, except (1), (2), and (4), which are left in their original form; and (13)-(14), which were adjusted by the compilers. Series (11) is adjusted through 1916 only.

- (1) **INDEX OF WHOLESALE PRICES**
Bureau of Labor Statistics, *Bulletin 543*, pp. 7-8.
- (2) **INDEX OF WAGES**
Snyder's index of composite wages. Furnished by Federal Reserve Bank of New York.

- (3) **COMMERCIAL PAPER RATES**
Frederick R. Macaulay, *Interest Rates, Bond Yields and Stock Prices*, Appendix A, Table 10, col. 3, pp. A156-7.
- (4) **INDEX OF COMMON STOCK PRICES**
Alfred Cowles 3rd and Associates, *Common-Stock Indexes, 1871-1937* (Principia Press, 1938), p. 67.
- (5) **BANK CLEARINGS OUTSIDE N.Y. CITY**
Daily averages. *Commercial and Financial Chronicle*, Vol. 102, p. 191; Vol. 104, p. 106; Vol. 106, p. 16; Vol. 108, p. 208; Vol. 110, p. 302.
- (6) **FACTORY PAYROLLS, N.Y. STATE**
New York State, Department of Labor, *The Industrial Bulletin*, Jan. 1942, p. 9.
- (7) **CONSTRUCTION CONTRACTS, 27 STATES**
Furnished by F. W. Dodge Corporation.
- (8) **TOTAL IMPORTS**
See this appendix, note on series (27) of Chart 8.
- (9) **TOTAL EXPORTS**
See this appendix, note on series (28) of Chart 8.
- (10) **LIABILITIES OF BUSINESS FAILURES**
Bradstreet's.
- (11) **CORPORATE CAPITAL ISSUES**
Bonds, notes and stocks. Refunding issues included; also foreign issues. *Journal of Commerce*, Jan. 2d or 3d numbers, 1915-19.
- (12) **NET OPERATING INCOME, U.S. STEEL CORP.**
Commercial and Financial Chronicle, Vol. 106, p. 494; Vol. 110, p. 463. See description in Vol. 106, p. 493.
- (13) **PRODUCTION, BASIC INDUSTRIES**
Federal Reserve Bulletin, May 1924, p. 422.
- (14) **R.R. REVENUE FREIGHT TON-MILES**
Estimates furnished by Babson Statistical Organization, Inc.
- (15) **FACTORY EMPLOYMENT, N.Y. STATE**
Same as (6).
- (16) **PIG IRON PRODUCTION**
Daily averages. Frederick R. Macaulay, *Interest Rates, Bond Yields and Stock Prices*, Appendix A, Table 27, col. 4, pp. A264-5.
- (17) **COTTON CONSUMPTION**
In running bales. Bureau of the Census (bulletins on Cotton Production and Distribution), *Bulletin 135*, pp. 57-8; *Bulletin 145*, p. 57.
- (18) **PORTLAND CEMENT PRODUCTION**
W. M. Persons, W. T. Foster, and A. J. Hettinger, Jr. (editors), *The Problem of Business Forecasting* (Houghton Mifflin, 1924), pp. 160-1.
- (19) **OAK FLOORING PRODUCTION**
Survey of Current Business, May 1924, pp. 36-7.
- (20) **PASSENGER CAR PRODUCTION**
Ibid., June 1927, p. 22.

- (21) TRUCK PRODUCTION
Same as (20).
- (22) BONDS TRADED, N.Y. STOCK EXCHANGE
In dollars, par value of bonds sold. *New York Stock Exchange Bulletin*, Aug. 1934, p. 10A.
- (23) SHARES TRADED, N.Y. STOCK EXCHANGE
Number sold. Same as (22).

Table 21

All series are adjusted for seasonal variations, except (19)-(23), (25)-(26), (28)-(29), (31)-(33), (37)-(38), and (42). No seasonal adjustment of (12)-(13) after 1930, (24) before 1921, (27) after 1929, (39) after May 1931. Except for (1)-(5), (9)-(10), and the Babson segment of (15), all seasonal adjustments are by the National Bureau.

All series have been analyzed on a monthly basis, except the following which are quarterly: (11)-(13), (43) and (45) through 1897, and (44) and (46) through 1894.

- (1) AYRES' INDEX OF BUSINESS ACTIVITY
Adjusted for trend. From publications by Cleveland Trust Co. Through 1928, chart on *American Business Activity since 1790* (7th ed., Jan. 1933). Since 1929, *Business Bulletin*, Jan. 15, 1935. (For revised figures since 1923, see Leonard P. Ayres, *Turning Points in Business Cycles*, pp. 197-9.)
- (2) PERSONS' INDEX OF PRODUCTION AND TRADE
Adjusted for trend. Through 1902, Warren M. Persons, *Forecasting Business Cycles*, pp. 93-125. From 1903 to trough in 1919, *Review of Economic Statistics*, April 1923, pp. 75-6. From trough in 1919 to 1933, *ibid.*, Aug. 1933, pp. 157-60. (For revised data starting in 1919, see Edwin Frickey, *Barron's Index of Business since 1899*, Barron's Publishing Co., 1943.)
- (3) AXE-HOUGHTON INDEX OF TRADE AND INDUSTRIAL ACTIVITY
Based on pig iron production, imports, bank clearings outside N.Y. City, and revenue per mile of selected railroads. (Not adjusted for trend.) Furnished by E. W. Axe and Company, Inc., N.Y. City.
- (4) A.T.&T. INDEX OF BUSINESS ACTIVITY
Adjusted for secular trend. Through trough in 1900, *Harvard Business Review*, Jan. 1923, p. 159. From trough in 1900 to July 1932, *Index of Industrial Activity in the United States* (a confidential report of the American Telephone and Telegraph Company, Oct. 20, 1932). Since Aug. 1932, the company's *Summary of Business Conditions in the United States*. (The series has been revised according to later confidential releases of the Chief Statistician's Division.)
- (5) PITTSBURGH INDEX OF BUSINESS
Adjusted for secular trend. Furnished by Bureau of Business Research, University of Pittsburgh. Described in *Pittsburgh Business Review*, Oct. 1933.
- (6) BANK CLEARINGS, TOTAL
Daily averages for a varying (generally increasing) number of cities. Through 1883, *The Public* (formerly *The Financier*). Since 1884, *Commercial and Financial Chronicle*.
- (7) BANK CLEARINGS OUTSIDE N.Y. CITY
Same as (6).
- (8) BANK CLEARINGS OUTSIDE N.Y. CITY, DEFLATED
The series on clearings (before deflation) is not the same as (7). Continued after 1918 with bank debits in 140 centers outside N.Y. City, adjusted to the level of 'outside' bank clearings in Jan. 1919. Deflated by Snyder's index of the general price level. See Ch. 6, note 7.

- (9) **SNYDER'S CLEARINGS INDEX OF BUSINESS**
Adjusted for secular trend and changes in the general level of prices; smoothed by a 3-month moving average. Based on bank clearings outside N.Y. City through 1918, on bank debits in 140 centers outside N.Y. City since 1919. Furnished by Federal Reserve Bank of New York.
- (10) **SNYDER'S INDEX OF DEPOSITS ACTIVITY**
Adjusted for secular trend through 1918; smoothed throughout by a 3-month moving average. Through 1918, *Review of Economic Statistics*, Oct. 1924, p. 258. Since 1919, furnished by Federal Reserve Bank of New York.
- (11) **ORDERS FOR LOCOMOTIVES**
Number of locomotives. Through trough in 1924, John E. Partington, *Railroad Purchasing and the Business Cycle*, pp. 219-26. Later data from *Survey of Current Business*.
- (12) **ORDERS FOR FREIGHT CARS**
Number of cars. Through trough in 1924, same as (11). Later data from *Iron Trade Review*.
- (13) **ORDERS FOR PASSENGER CARS**
Number of railroad cars. Same as (11).
- (14) **PLANS FILED FOR NEW BUILDINGS, MANHATTAN**
In dollars. Bronx included through trough in 1904; later data confined to Manhattan. Through 1879, *The City Record* (New York), Jan. 19, 1880, p. 104. For 1880-1909 and 1917-19, *Real Estate Record and Builder's Guide*. For 1910-16 and after 1919, Borough of Manhattan, Dept. of Buildings, *Annual Report*.
- (15) **RAILROAD FREIGHT TON-MILES**
Data for 1908-12 and 1919-21 cycles include nonrevenue ton-miles. Through trough in 1908, and from trough in 1912 to trough in 1919, the data are estimates furnished by Babson Statistical Organization, Inc. From trough in 1908 to trough in 1912, American Railway Association, *Proceedings*, May 20, 1914, pp. 525, 527. From trough in 1919 to trough in 1921, Interstate Commerce Commission, *Statistics of Railways*, 1922, p. XCV. Later data from the Commission's *Revenue Traffic Statistics of Class I Steam Railways*.
- (16) **PIC IRON PRODUCTION**
See Ch. 6, note 7.
- (17) **TOTAL IMPORTS**
General imports. Derived from publications of Bureau of Foreign and Domestic Commerce (or its predecessors): through June 1914, *Monthly Summary of Commerce and Finance*, Dec. 1910, pp. 1120-6, and later issues; since July 1914, *Monthly Summary of Foreign Commerce*.
- (18) **TOTAL EXPORTS**
Re-exports of foreign merchandise included. Same as (17).
- (19) **SNYDER'S INDEX OF GENERAL PRICES**
Through 1912, a composite of indexes of wholesale prices, cost of living, wages, security prices, urban realty prices, and rents. For the period since 1913, see Carl Snyder, *The Measure of the General Price Level*, *Review of Economic Statistics*, Feb. 1928, pp. 40-52. Data furnished by Federal Reserve Bank of New York.
- (20) **WHOLESALE PRICES. TOTAL**
Through trough in 1891, George F. Warren and Frank A. Pearson, *Prices*, pp. 12-13. Later data from publications of the Bureau of Labor Statistics: through 1931, *Bulletin*, various issues; since 1932, *Wholesale Prices*.
- (21) **METALS AND METAL PRODUCTS, WHOLESALE PRICES**
Publications of the Bureau of Labor Statistics, as in (20).
- (22) **BUILDING MATERIALS, WHOLESALE PRICES**
Same as (21).

- (23) FUEL AND LIGHTING, WHOLESALE PRICES
Same as (21).
- (24) CHEMICALS AND DRUGS, WHOLESALE PRICES
Same as (21).
- (25) TEXTILES, WHOLESALE PRICES
Same as (21).
- (26) HOUSEFURNISHING GOODS, WHOLESALE PRICES
Same as (21).
- (27) HIDES AND LEATHER PRODUCTS, WHOLESALE PRICES
Same as (21).
- (28) PIG IRON, WHOLESALE PRICE, PHILADELPHIA
Through trough in 1912, price of 'No. 1 anthracite foundry' pig iron; later, 'basic' pig iron. American Iron and Steel Institute, *Annual Report*.
- (29) STEEL BILLETS, WHOLESALE PRICE, PITTSBURGH
Price of 'Bessemer' steel billets through 1928; 'open hearth, rerolling' steel billets since 1929. Through 1889, *Iron Age*, Jan. 7, 1915, p. 12. Later data from publications of the Bureau of Labor Statistics, as in (20).
- (30) SLAB ZINC, WHOLESALE PRICE, N.Y. CITY
Through trough in 1900, *The Mineral Industry*, 1892, p. 471, and later issues. Later data from *Iron Age* (Jan. annual review numbers).
- (31) COPPER, WHOLESALE PRICE, N.Y. CITY
Through trough in 1912, 'lake' copper; later, 'electrolytic' copper. Through 1895, *The Mineral Industry*, 1893, p. 253, and later issues. Since 1896, *Engineering and Mining Journal*.
- (32) PIG LEAD, WHOLESALE PRICE, N.Y. CITY
Through 1889, *The Mineral Industry*, 1893, p. 423. Since 1890, *Engineering and Mining Journal*.
- (33) PIG TIN, WHOLESALE PRICE, N.Y. CITY
Through 1899, *The Mineral Industry*, 1893, p. 612, and later issues. Since 1900, *Metal Statistics* (published by American Metal Market).
- (34) BANK CLEARINGS, N.Y. CITY
Daily averages. Through Sept. 1860 and for 1864-74, New York State Chamber of Commerce, *Annual Report*. From Oct. 1860 through 1861, *The Bankers' Magazine*. For 1862-63, *The Merchants' Magazine and Commercial Review*. For 1874-83, *The Public*. Since 1884, *Commercial and Financial Chronicle*.
- (35) SHARES TRADED, N.Y. STOCK EXCHANGE
See Ch. 6, note 7.
- (36) BONDS TRADED, N.Y. STOCK EXCHANGE
In dollars, par value of bonds sold. Through 1897, *New York Times*, 1905, different issues. Since 1898, *New York Stock Exchange Bulletin*, Aug. 1934, pp. 10A-B.
- (37) INDEX OF 'ALL' COMMON STOCK PRICES
Alfred Cowles 3rd and Associates, *op. cit.*, pp. 66-7.
- (38) INDEX OF RAILROAD STOCK PRICES
See Ch. 6, note 7.
- (39) CALL MONEY RATES, N.Y. STOCK EXCHANGE
See Ch. 6, note 7.

- (40) 90-DAY MONEY RATES, STOCK EXCHANGE LOANS, N.Y. CITY
 Frederick R. Macaulay, *Interest Rates, Bond Yields and Stock Prices*, Appendix A, Table 10, col. 2, pp. A150-61.
- (41) COMMERCIAL PAPER RATES, N.Y. CITY
Ibid., col. 3, pp. A142-61.
- (42) RAILROAD BOND YIELDS
 See Ch. 6, note 7.
- (43) NUMBER OF FAILURES
Dun's Review, successive issues. Includes manufacturing and mining concerns, builders, employers of labor in mechanic arts; also trading concerns, agents and brokers; but not professional men, banks (after 1892), or railroads. See *Dun's Review*, Dec. 30, 1893, pp. 2-3, and Feb. 1936, p. 21.
- (44) NUMBER OF FAILURES
Bradstreet's, successive issues. Apparently differs from (43) in including banks, and excluding stock brokers and real estate dealers.
- (45) LIABILITIES OF FAILURES
 Same as (43).
- (46) LIABILITIES OF FAILURES
 Same as (44).

Chapter 5

Chart 11

Every series except that for petroleum is plotted from the beginning of its statistical record by months. The output of petroleum from the Appalachian field is available by months from 1868 on. All series are adjusted for seasonal variations.

- (1) COKE PRODUCTION
 See text, Table 4.
- (2) BITUMINOUS COAL PRODUCTION
 See text, Table 13.
- (3) CALVES SLAUGHTERED
 Federally inspected slaughter. Bureau of Agricultural Economics, *Livestock, Meats, and Wool: Market Statistics and Related Data*, 1933, p. 59.
- (4) COTTON STOCKS AT MILLS
 Derived from Bureau of the Census bulletins on *Cotton Production and Distribution*.
- (5) PETROLEUM OUTPUT, APPALACHIAN FIELD
 Daily averages. Through 1931, *Mineral Resources* (by Geological Survey through 1923, later by Bureau of Mines). Since 1932, Bureau of Mines, *Minerals Yearbook*.
- (6) STRUCTURAL STEEL ORDERS
 Through 1922, Bureau of the Census, *Record Book of Business Statistics*, Part II, p. 32. For 1923-32, *Survey of Current Business*, 1932 Supplement, pp. 216-7, and later monthly issues. For 1933, American Institute of Steel Construction, Inc., *Annual Report*, 1941, p. 89.

Chart 12

The series are adjusted for seasonal variations.

- (1) SLAB ZINC, WHOLESALE PRICE
Iron Age, Jan. 5, 1939, p. 209.
- (2) SHARES TRADED, N.Y. STOCK EXCHANGE
 See Ch. 6, note 7.

Charts 16, 17, 20, 21

All series are adjusted for seasonal variations except (3), (4) and (10). The seasonal correction of (6) stops in May 1931.

- (1) BITUMINOUS COAL PRODUCTION
See text, Table 13.
- (2) PIG IRON PRODUCTION
See Ch. 6, note 7.
- (3) PRICE OF PIG IRON
Weighted average of prices of four leading grades. Derived from publications of the Bureau of Labor Statistics: through 1931, *Bulletin*, various issues; since 1932, *Wholesale Prices*.
- (4) RAILROAD BOND YIELDS
See Ch. 6, note 7.
- (5) SHARES TRADED
See Ch. 6, note 7.
- (6) CALL MONEY RATES
See Ch. 6, note 7.
- (7) TOTAL EXPORTS
See this appendix, note on series (18) of Table 21.
- (8) SUGAR MELTINGS
Data relating to four ports overlapped in 1921 with data for eight ports. For four ports, *Weekly Statistical Sugar Trade Journal*. For eight ports, *Survey of Current Business*, Oct. 1937, p. 17; 1940 Supplement, p. 113.
- (9) POSTAL RECEIPTS
Receipts at 50 selected (largest) cities. Through 1919, furnished by Post Office Department. Since 1920, *Survey of Current Business*.
- (10) SLAB ZINC STOCKS AT REFINERIES
Data refer to end of month. Furnished by American Zinc Institute.

Chapter 8

Chart 45

Series S consists of monthly readings from a simple sine curve, ranging from a trough of 800 to a peak of 1200, with a period of 44 months. Its equation is $y = 1000 + 200 \sin x$, where x is the number of months multiplied by $8^{\circ}11'$.

Series C also ranges from a trough of 800 to a peak of 1200, and has a period of 44 months. It is made from a segment of a tangent function, $y = 1000 + 38 [(\tan x) - 1]$. The selected segment falls between $x = 45^{\circ}$ and $x = 80^{\circ} 56'$ inclusive. By taking a monthly reading every $3^{\circ}16'$, the second half of the cyclical rise (starting with the mid-expansion month and ending with the peak month) was obtained. By using the deviations of these figures from 1000, in reverse order and changing signs, the first half of the rise (from the trough month through the mid-expansion month) was obtained. The contraction is the same as the expansion, with the order of the figures reversed.

Series T has 'triangular' cycles, with a period of 44 months. It starts from a trough of 800, rises by a monthly increment of 18.18 to a peak of 1200, and then falls away at the rate of 18.18 per month to a trough of 800.

The basic random series was obtained as follows. First, we took the two digit random numbers given in Table XXXIII of *Statistical Tables*, by R. A. Fisher and F. Yates. This is a series of random numbers from a rectangular frequency distribution, with a range from 0 to 99 inclusive. In order to obtain a random series with a normal distribution, the numbers from 1 to 99 (zeros were

skipped) were assumed to represent percentiles of a normal distribution, and the corresponding values of the normal deviate were taken from Table IX in the above source. For example, the normal deviate corresponding to the 1st percentile is -2.3263 (which means that one per cent of the observations in a normal population, with mean of zero and variance of unity, have deviates algebraically less than -2.3263). After transforming the numbers 1 to 99 to normal deviates, the latter were multiplied by 50; so that the range of the *basic random series* is 232 (from -116 to $+116$), or somewhat more than one-half the range of the cyclical series.

Series S, C and T are aligned: their troughs come in the same month, as do their peaks. The basic random series is fixed in time for all series. Series S' is the sum of the sine function and the basic random series. Series S'' is the sum of the sine function and twice the basic random series. And so on for the other series, as explained in the text.

Each series covers six full cycles, counting from troughs, with a few additional values placed before the first and after the last trough. The number of monthly values used in a series is 282. Smoothing by Macaulay's formula involves a loss of 21 items at each end. Hence the smoothed data cover only four cycles from trough to trough, and five cycles from peak to peak.

Series S', S'', C' and C'' are adaptations of artificial series originally worked out by Geoffrey H. Moore and W. Allen Wallis, to whom we owe thanks.

Chapter 10

Chart 59

The index of orders is based upon quarterly figures for locomotives, freight cars, passenger cars, and rails. These series come from John E. Partington, *Railroad Purchasing and the Business Cycle*, pp. 219-26, through the trough in 1924; continued with data from the *Railway Age* for locomotives and passenger cars, and from the *Iron Trade Review* for freight cars. The index was obtained by averaging the reference-cycle patterns of the four series for each business cycle (except that rail orders are not used after the trough in 1924). This operation combines two steps: the construction of a rough index of orders and a reference-cycle analysis of the index. The implicit index number is an unweighted arithmetic mean of relatives, the average standing of each series during a reference cycle being the base.

The data on freight ton-miles are compiled from various sources. See this appendix, note on series (15) of Table 21.

Chapter 12

Chart 77

The index of American crop production includes 12 basic crops and comes from the Bureau of Agricultural Economics, *Agricultural Situation*, Jan. 1935, Oct. 1937; figures for recent years were furnished by the Bureau of Agricultural Economics. For the British index from 1866 to 1931, see Leo Drescher, *Die Entwicklung der Agrarproduktion Grossbritanniens und Irlands seit Beginn des 19. Jahrhunderts*, *Weltwirtschaftliches Archiv*, Vol. 41, March 1935, pp. 293-4. To cover recent years, we extended this index by methods similar to Drescher's.

For the source of the American pig iron series, see Ch. 6, note 7. The British iron series comes from *The Iron and Coal Trades Review*.