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Measuring Trade Credit Quality: Selected Financial Ratios

Capacity to Repay Debt

The capacity of debtor firms to meet their current financial obligations is an important measure of the quality of trade credit. This condition is commonly expressed by various financial ratios derived from the balance sheets and income accounts of business enterprises. This chapter explores the prognostic ability of these data.

Since most trade credit is extended under terms of less than sixty days, the creditor's forecast of the borrower's repayment capacity is a short-term one. Capacity to pay in the short run rests principally upon the firm's liquid and current assets and the obligations to which these assets are committed. These obligations include, in addition to debt payments, the need for working capital to meet routine operating expenses and emergencies.

The importance of liquidity as a measure of credit quality has been attested to by three earlier studies made of the financial condition of firms that eventually failed.[1] Of a total of thirty-five different financial ratios tested, only four consistently predicted, as early as six years in advance, the financial difficulties of these firms as a group. The ratios are: current assets to current liabilities (the current ratio); cash and government securities to current liabilities (the quick ratio); current assets minus current liabilities to total assets (the working capital ratio), and net worth to total liabilities (the worth-to-debt ratio). Of these four ratios, the first three are measures of the firms' capacity to repay debt in the short run.

[1] Raymond F. Smith and Arthur W. Winakor conducted these studies in the 1930's and Charles L. Merwin in the 1940's. See subsequent footnote references.

The current ratio, although traditionally stressed in financial analysis, was the weakest prognosticator. Since it includes receivables among the assets, it is composed in part of the very item whose quality is being judged. Furthermore, inventories, which are also part of current assets, may include unsalable merchandise. Under the pressure of a business decline, the value of even the active inventory may fall and the volume of uncollectable receivables may rise. The current ratio is therefore limited as a measure of trade credit quality.

The quick ratio is a refinement of the current ratio intended to reduce this limitation and to measure the extent of "true" liquidity. However, while the current ratio tends to overstate the degree of liquidity, the quick ratio tends to understate it by entirely ignoring receivables and inventories.

These two ratios, which in effect measure the maximum and minimum liquidity of firms, are usefully supplemented by the working capital ratio. As a ratio to total assets, working capital is placed in relation to the size of the firm. This enhances its diagnostic value. When used together with the current and quick ratios, a three-dimensional view is obtained of the current position of firms.

The worth-to-debt ratio is another helpful indicator of credit risk. Besides showing a rising debt burden, an increasing proportion of debt in the capital structure may reflect a declining entrepreneurial concern, investors' negative judgment of potential profits, and a limited "cushion" upon which creditors may fall.

Of the three studies of failures noted above, the first was based on twenty-nine firms that failed between 1921 and 1927. It was conducted in 1930 by Raymond F. Smith at the University of Illinois.[2] In 1935 Smith and Winakor extended this analysis to 183 firms that failed between 1923 and 1931. Their sample represented 25 per cent of the large industrial failures in this period (with capital in excess of $100,000).[3] The findings were essentially the same as those of Smith's earlier study. Only the four ratios cited above had a persistent decline for an appreciable period of time before the failure of firms. The current ratio was the weakest of the four in predicting failure; it declined con-

[2] Raymond F. Smith, *A Test Analysis of Unsuccessful Industry Companies*, University of Illinois, Bureau of Business Research, Bulletin No. 31, 1930. See Appendix Table B-9.

[3] Raymond F. Smith and Arthur H. Winakor, *Changes in the Financial Structure of Unsuccessful Industrial Corporations*, University of Illinois, Bureau of Business Research, Bulletin No. 51, 1935, p. 8. See Appendix Table B-10.

tinuously for only three years before failure. Consistency of behavior diminished for the respective ratios when the sample was broken into smaller industry groups.

Charles L. Merwin conducted a third study in this field.[4] A unique feature is its use of a norm permitting a comparison between 381 continuing and 200 discontinuing firms. This provided a more rigorous test of the predictive ability of financial ratios. Merwin's findings confirmed those of Smith and Winakor.

The foregoing studies offer evidence that the financial structure of firms destined for failure begins to deviate from that of firms due to survive as early as six years before the actual failure. Merwin calls attention to this fact and states that the length of the period during which the financial structure indicates approaching failure reflects the extent of the resistance offered to the forces of deflation. The length and severity of a crisis may therefore depend, to a large extent, on the resistance to liquidation offered to the forces of deflation by the business community during the downtrend. The four selected financial ratios can help to gauge this prospect for the economy as a whole and for broad subsectors (see below).

Postwar Behavior of Selected Ratios

Judging by the behavior of the four predictive financial ratios, the financial position of firms in the major business sectors declined appreciably between the two cyclical peaks, 1948 and 1960. For all sectors combined, the quick ratio declined about 40 per cent, the current ratio by one-fifth, and the working capital and worth-to-debt ratios each by one-quarter (Table 24 and Chart 7). Quarterly data on the current ratio and the quick ratio for all nonfinancial corporations show that the decline has continued into the 1960's (Chart 8).

With the one exception of giant wholesale firms, whose worth-to-debt ratio improved 3 per cent, the four ratios declined in every sector and size group between 1947 and 1957 (Table 25). Table 26 lists the absolute level of these ratios in 1957. Interestingly, in that year the financial ratios of giant retail firms were roughly twice as high as those

[4] Charles L. Merwin, *Financing Small Corporations*, New York, NBER, 1942, Chapter 4. See Appendix Table B-11.

TABLE 24

SELECTED FINANCIAL RATIOS, ALL MAJOR BUSINESS SECTORS, 1947-60

(per cent)

	Quick Ratio	Current Ratio	Net Working Capital Ratio	Worth-to-Debt Ratio
1947	67.1	233.5	33.9	190.5
1948	66.3	239.2	33.8	194.4
1949	79.7	260.3	34.8	215.6
1950	64.5	229.6	33.6	184.7
1951	58.5	217.5	32.2	167.3
1952	56.4	218.6	31.8	163.2
1953	57.2	215.9	31.0	163.8
1954	57.8	218.9	30.4	166.7
1955	52.9	207.0	29.5	158.9
1956	44.1	200.6	28.0	152.5
1957	43.9	203.4	27.6	153.9
1958	45.7	208.8	28.2	155.3
1959	42.7	195.8	26.6	144.7
1959[a]	—	(200.2)	(27.8)	—
1960	39.1	190.0	24.9	143.2
1960[a]	—	(195.5)	(26.4)	—
Percentage change:				
1948-60	-41	-21	-26	-26
1948-60[a]	—	-18	-22	—

SOURCE: *Statistics of Income*. Includes mining, manufacturing, wholesale, retail, service, and construction sectors.

[a] A change in the definition of accounts in the 1959 *Statistics of Income* combined nontrade receivables, hitherto present in notes and accounts receivable, with prepaid expenses and other asset items to form the new account—other current assets. Ratios for 1959 and 1960 were calculated with and without the new account. Rows marked a are the high estimate as they include this new account. Thus the rows marked a under percentage change represent the low estimate of change for the period indicated.

CHART 7

Selected Financial Ratios for Corporations, by Sector, 1947-60

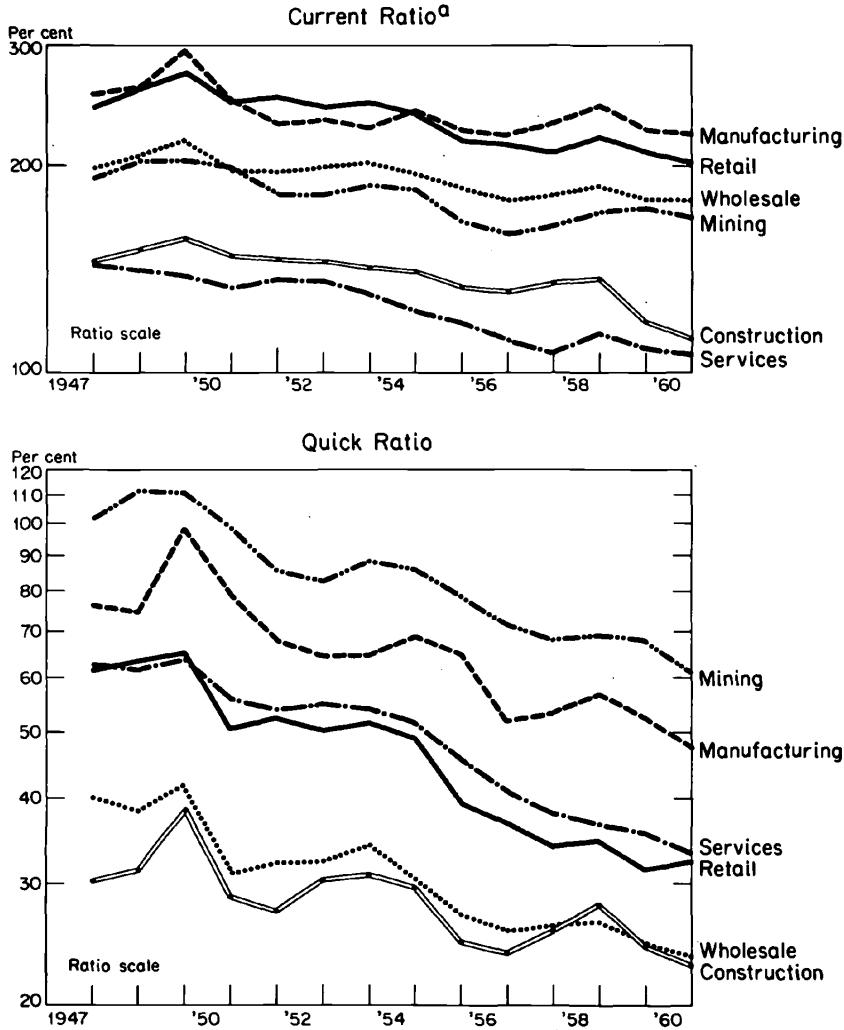


CHART 7 (continued)

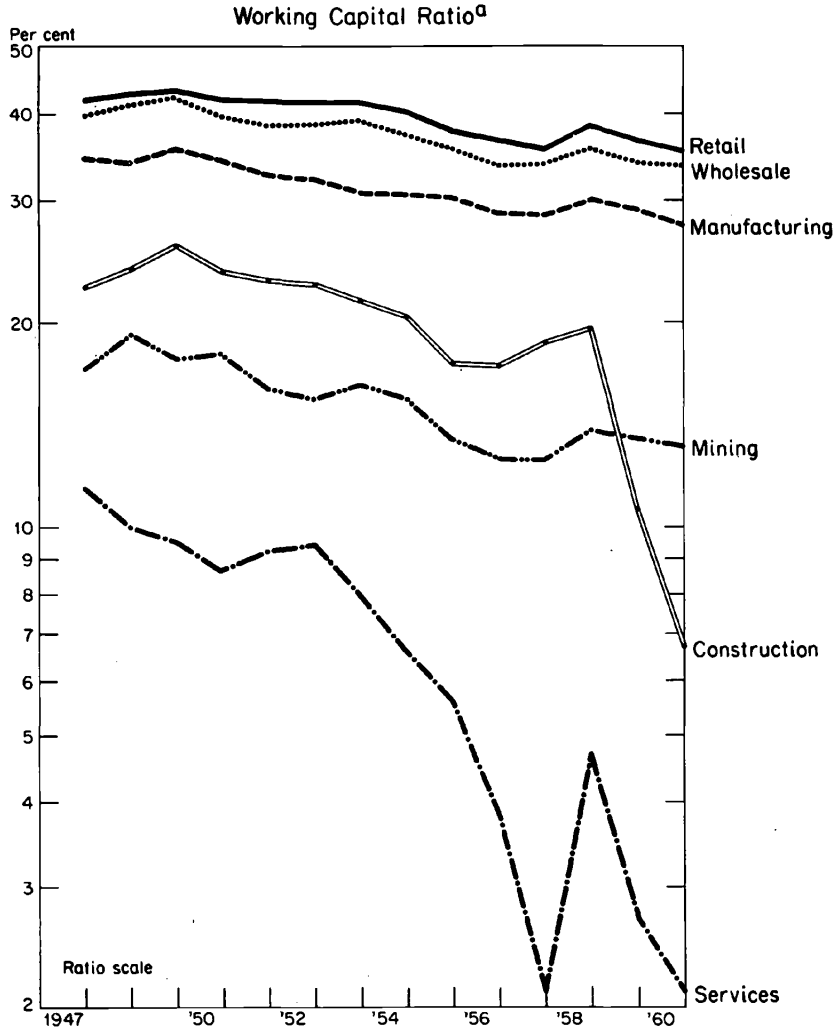
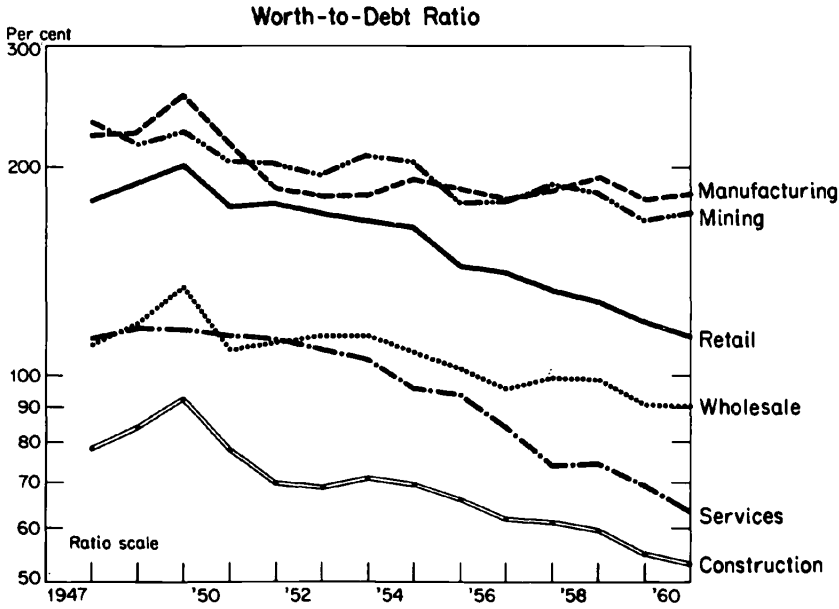


CHART 7 (concluded)

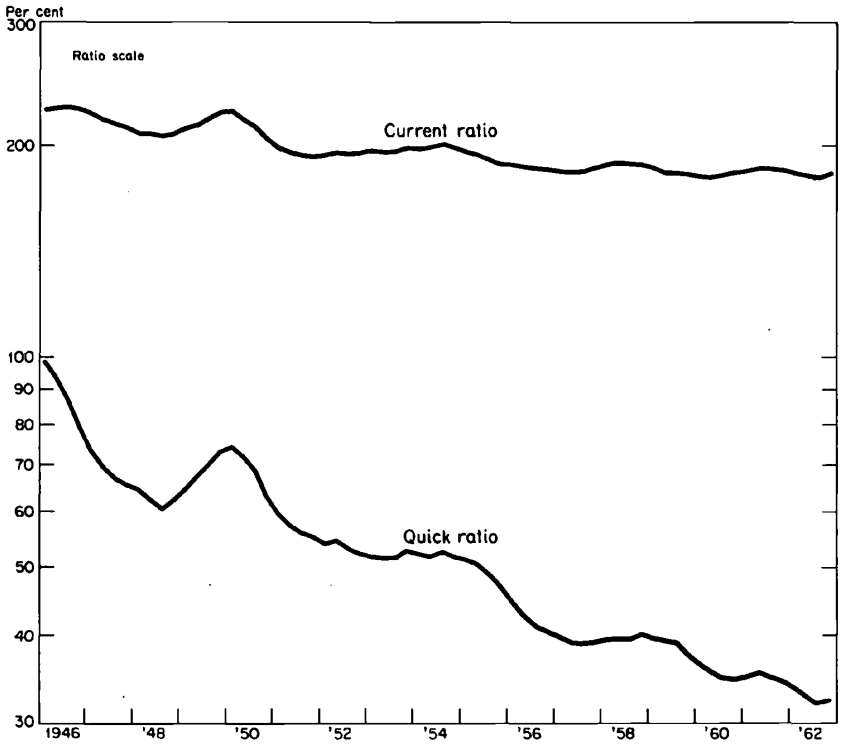


SOURCE: Tables B-3, B-4, B-5, and B-6.

[a] The Treasury *Source Book* balance-sheet accounts were altered in 1959 and 1960, resulting in an increase in the levels of the *current* and *working capital ratios*. As a result, comparability with earlier years is limited. The higher estimates are presented here. See note a to Table 24.

CHART 8

Financial Ratios for Nonfinancial Corporations, 1946-62
(seasonally adjusted)



SOURCE: Table B-8.

of small retailers. The relative position of these two groups altered radically in 1947-57, with small retailers showing much greater deterioration in financial strength. A similar shift in the position of small firms relative to larger firms occurred in every sector.[5]

Percentage changes in the selected ratios in various manufacturing industries, as shown by FTC-SEC data for 1947-60, are given in Table 27. The liquidity position of textile, apparel, lumber, leather, and primary nonferrous metal industries declined by more than half. There was a slight improvement in a few ratios in selected industries, but the pattern was generally downward. Only in the petroleum and coal industry did more than one ratio improve in this period. The FTC-SEC quarterly financial ratios for *all* manufacturing corporations, adjusted for seasonal variation in the period 1947-62 (see Appendix Table B-7 and Chart 9), show that, with the exception of cyclical improvements, the selected ratios had a persistent long-term downward movement. All but the working capital ratio improved between the first quarter of 1957 and the last quarter of 1958, a period of general business contraction, and all but the current ratio resumed their decline from the last quarter of 1958 through the third quarter of 1962. During this later phase, the current ratio was approximately stable and the quick ratio and working capital ratio each reached their lowest level in the postwar period.

These findings suggest that the unusually strong credit position of American business resulting from the liquidation of debt during World War II and the wartime and postwar inflation in values had largely disappeared by the late 1950's and that this decline persisted into the 1960's.

Further research is required to determine at what levels these ratios indicate that a serious impairment of the underlying quality of business credit takes place. This would entail establishing a correlation between the qualitative measures and incidences of delinquencies, defaults, and losses, for different groupings of firms.

The scanty nature of available data precludes such a sophisticated correlation analysis at this time. Nevertheless some experiments were conducted along these lines. Different financial and operating ratios were combined and correlated with series representing credit difficulties. The correlations, made for different business sectors, generally passed tests of statistical significance and the quality measures anticipated credit difficulties during the ensuing year or so.

[5] See Appendix B for annual ratios of corporations by sector and size.

TABLE 25

PERCENTAGE CHANGE IN SELECTED RATIOS, BY SECTOR AND SIZE OF FIRM, 1947-57

Sector	Size of Firm	Ratios				
		Quick	Current	Net Working Capital	Worth-to-Debt	Average Change[a] (horizontal)
Mining		–33	–15	–26	–19	–23
	Small	–38	–25	(–)	–26	–47[a]
	Medium	–35	–18	–37	–25	–29
	Large	–32	–25	–24	–30	–28
	Giant	–42	–15	–22	–16	–24
Manufacturing		–31	–10	–17	–16	–19
	Small	–33	–17	–22	–26	–25
	Medium	–29	–10	–12	–12	–16
	Large	–27	– 5	– 9	–11	–13
	Giant	–35	–13	–17	–19	–21
Wholesale		–35	– 9	–16	–11	–18
	Small	–39	–18	–23	–27	–27
	Medium	–40	–14	–18	–20	–23
	Large	–36	– 7	–13	– 4	–15
	Giant	–27	– 1	– 9	+ 3	– 9
Retail		–45	–14	–16	–26	–25
	Small	–51	–29	–36	–46	–41
	Medium	–59	–16	–17	–29	–30
	Large	–55	–17	–18	–24	–29
	Giant	–19	– 2	– 8	–14	–11
Services		–39	–26	–82	–35	–46
	Small	–35	–25	(–)	–41	–50[a]
	Medium	–41	–27	–84	–36	–47
	Large	–41	–23	(–)	–33	–49[a]
	Giant	–41	–34	–51	–37	–41
Construction		–16	– 7	–17	–22	–16
	Small	–27	–18	–39	–35	–30
	Medium	–16	– 8	–15	–23	–16
	Large	– 8	– 4	– 9	–22	–11
	Giant	–22	– 9	–18	–15	–16

SOURCE: Treasury *Source Book*. See Appendix B for annual ratios.

NOTE: Entries in parentheses indicate that net working capital is negative.

[a] A simple average of the percentage changes of all four financial ratios. In those instances where the working capital ratio was negative, the percentage change for that cell was treated as a 100 per cent decline. The average decline of the four ratios is understated in such cases.

TABLE 26

SELECTED RATIOS IN 1957, BY SECTOR AND SIZE OF FIRM

(per cent)

Sector	Size of Firm	Ratios			
		Quick	Current	Net Working Capital	Worth-to-Debt
Mining		68	163	13	188
	Small	33	89	(4)	99
	Medium	56	140	9	161
	Large	88	203	16	214
	Giant	86	200	17	228
Manufacturing		53	229	29	186
	Small	36	170	25	119
	Medium	48	220	33	183
	Large	58	258	35	210
	Giant	57	237	26	192
Wholesale		26	181	34	99
	Small	31	178	34	96
	Medium	26	186	37	102
	Large	25	185	36	106
	Giant	25	177	31	94
Retail		34	209	35	133
	Small	26	160	26	81
	Medium	25	194	35	116
	Large	27	195	33	130
	Giant	54	263	40	178
Services		38	107	2	74
	Small	35	92	(3)	61
	Medium	35	96	1	74
	Large	36	94	(2)	64
	Giant	44	136	10	88
Construction		26	135	19	61
	Small	28	130	16	58
	Medium	27	139	20	65
	Large	24	130	18	51
	Giant	25	143	20	76

SOURCE: Treasury *Source Book*. See Appendix B for annual ratios.

NOTE: Entries in parentheses indicate that net working capital is negative.

The following comparison (see Tables 14, 15, and Appendix B) suggests that at least a rough relationship exists between major shifts in financial ratios of small corporations and rates of business failure (which are largely confined to small firms). The difference in dates for the financial ratios and the failure rates is intended to allow a lead time for the former. The difference in timing is less than the full year indicated since the financial ratios pertain to balance sheets for end-of-year dates running from July of one calendar year through June of the next, but concentrated mainly in the July-December period. The failure data, on the other hand, pertain to calendar years.

	Percentage Change in:		
	Average of Four Financial Ratios, Small Corps., 1947-59	Failure Rate Per 10,000 Firms, 1948-60	Failure Liabilities Ratio, 1948-60
Manufacturing	−30	+ 70	− 8
Wholesale	−31	+ 77	+ 60
Construction	−37	+323	+206
Retail	−42	+208	+110
Services	−45	+167	+ 14
Mining	−50	n.a.	+290

The above evidence indicates that the sectors with the largest declines in the financial ratios of their small firms generally experienced the greatest increase in incidence of failure. This corroborates the prognostic ability of some of the *ex ante* measures and the higher risk sensitivity of small firms discussed more fully below. This method of analysis is necessarily crude and employed only for illustrative purposes. Data more closely tied to credit difficulties and based upon some precisely comparable sector definitions (the large discrepancy between the two failure rates for the services sector may arise from definitional problems) are required for a rigorous correlation analysis.

TABLE 27

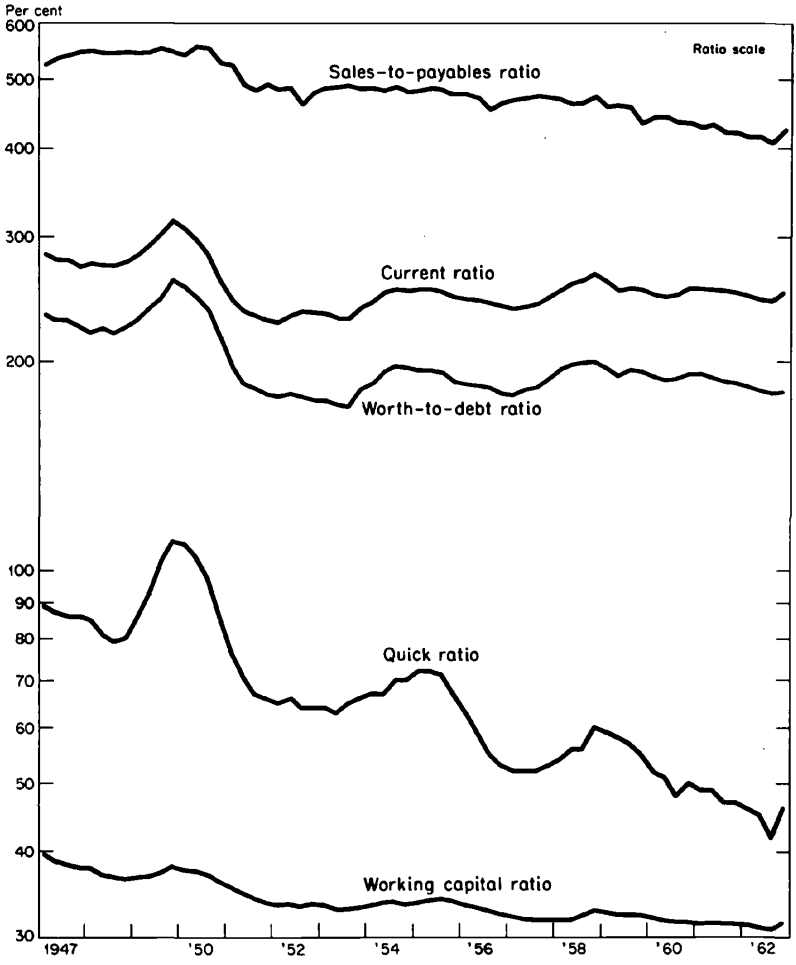
PERCENTAGE CHANGE IN SELECTED RATIOS, BY MANUFACTURING INDUSTRY, 1947-60

	Collection Period	Payables-to-Sales Ratio	Quick Ratio	Current Ratio	Net Working Capital Ratio	Worth-to-Debt Ratio
Total manufacturing	+56.1	+24.6	–37.4	– 6.0	–15.3	–13.6
Food	+63.4	+43.4	–32.8	0	– 7.3	– 5.1
Tobacco	+20.2	–30.2	–26.1	– 9.5	– 6.3	+43.8
Textile	+61.0	+28.5	–53.3	+ 4.0	– 6.0	–16.7
Apparel	+48.0	+68.6	–67.2	–24.8	–20.5	–48.1
Lumber	+51.8	+26.5	–52.8	+ 3.8	– 0.7	–38.5
Furniture	+48.4	+44.4	–30.9	– 2.9	– 1.6	–11.7
Paper	+43.5	+18.6	–33.3	+ 8.7	–15.3	– 7.1
Printing & publ.	+34.9	+ 3.0	–30.3	– 4.6	– 9.6	–23.5
Chemicals	+64.4	+18.6	–27.8	+ 2.5	–21.0	– 8.4
Petroleum & coal	+54.5	+24.1	–20.4	+ 0.4	–15.0	+ 4.0
Rubber	+51.2	+16.0	–43.6	– 5.1	– 9.3	+ 7.1
Leather	+54.4	+44.6	–50.8	–11.5	–10.1	–42.6
Stone, clay, glass	+52.6	+ 1.0	–19.0	+ 4.8	– 4.6	–16.9
Primary nonfer.	+65.9	+31.0	–60.6	– 5.4	–26.8	–50.4
Primary, iron & steel	+32.1	+24.1	–34.4	– 5.6	–21.0	–14.0
Fabricated metals	+51.4	+42.5	–42.2	– 1.4	– 5.8	–26.3
Machinery	+65.0	+16.2	–29.4	+ 2.6	– 7.8	–12.4
Electrical mach.	+49.0	+20.2	–42.6	– 6.4	–12.6	+ 7.3
Transport. equip.	+88.8	– 4.8	–27.7	–23.0	–28.8	–20.2
Automobiles	+12.1	–11.6	– 5.9	– 2.5	–17.9	+ 8.2
Instruments	+14.5	+66.9	–11.4	– 5.4	– 2.3	+13.8

SOURCE: *Quarterly Financial Report for Manufacturing Corporations*, FTC-SEC. Calculations are based on the last quarter of each year.

CHART 9

Financial Ratios for All Manufacturing Corporations, 1947-62 (seasonally adjusted)



SOURCE: Table B-7.