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Measuring Trade Credit Quality: Distribution of Trade Debt by Risk Characteristics of Debtor Firms

It has been shown that certain characteristics of business firms are associated with inferior credit ratings and with the highest incidence of credit loss. These characteristics include the size and age of debtor firms, with the smallest and youngest firms representing the highest risk. Presumably, the profitability of the debtor firm is also of consequence to the prospect of payment. The industrial sector to which the debtor concern belongs may be important too, but we shall concentrate upon size, age, and profitability. As the share of firms possessing these characteristics in the total trade debt outstanding increases, other things equal, the quality of trade credit declines.

Size of Firm

One of the characteristics of small business firms that causes them to be high credit risks is their general dependence upon a single manager. Illness or death poses a threat to the continuity of the small enterprise not generally found among large ones. A survey by the Department of Commerce revealed that 16 per cent of the firms liquidated in the second quarter of 1946 attributed the cause to illness or retirement of the entrepreneur. In addition, the small firm is seldom sufficiently diversified either in product or clientele to avoid being in a precarious position should demand suddenly shift. These attributes of smallness are inherent in the size of the firm regardless of the degree of business acumen possessed by the entrepreneur.

Distribution of Debt by Risk Characteristics

Another factor of risk generally attending small firms is their tendency to keep inadequate financial records.[1] Deficient records not only prevent appraisal of the past performance and the current condition of the potential debtor but also indicate that he is not fully aware of the proper rates of depreciation, his working capital position, or his operating performance. It is therefore unlikely that such a firm will be sensitive to important financial and operating changes which could spell the difference between success or failure. These characteristics are so frequently found in small firms that, as a group, they must be considered above-average risks. Trade credit extended to them is therefore of below-average quality.[2]

Table 34 shows the four selected ratios and the turnover of trade debt for manufacturing firms of different size in the second quarter of 1957. It will be noticed that the lowest ranking is almost always held by the smallest firms.[3] This size ranking of financial ratios is found regardless of the time period examined. The loss experience of the Reconstruction Finance Corporation corroborates this view of small firms.[4]

Other evidence relating size of firm to credit quality has been found in corporate bond experience.[5] Here, too, default varied inversely with the size of the debtor; with the regulated sectors, such as utilities and railroads, eliminated, the default rate on offerings of firms with under

[1] This was true of 40 per cent of the firms that failed in the second quarter of 1946. M. J. Ulmer and A. Nielsen, "Business Turnover and the Cause of Failure," *Survey of Current Business*, April 1947, p. 14. Also see: *Statistics of Income: Partnership Returns, 1953*, U.S. Treasury, p. 8; *Causes of Business Failure and Bankruptcies of Individuals in New Jersey, 1929-1930*, Domestic Commerce Series, No. 54, U.S. Department of Commerce, 1931, p. 6; *Causes of Commercial Bankruptcies*, Domestic Commerce Series, No. 69, 1932, p. 17.

[2] See manuscript in preparation at NBER on "Risks and Returns in Small-Business Financing" by Geoffrey H. Moore and Thomas R. Atkinson.

[3] A linear regression pattern is disrupted by the largest size group, firms with assets of $100 million and over. This exception is explained by the accessibility of the money market to the very largest firms. When they can obtain funds with relative ease, there is less need for the largest firms to maintain the same degree of liquidity or working capital as smaller firms must.

[4] R. J. Saulnier, H. G. Halcrow, and N. H. Jacoby, *Federal Lending and Loan Insurance*, Princeton for NBER, 1958, p. 481.

[5] W. Braddock Hickman, *Corporate Bond Quality and Investor Experience*, Princeton for NBER, 1958, p. 495, Table 106 and underlying tabulations.

TABLE 34

SELECTED RATIOS BY SIZE OF MANUFACTURING CORPORATION, SECOND QUARTER, 1957

(per cent)

Ratio	All Sizes	*Assets (thousand dollars)*			
		Under 250	250 to 1,000	50,000 to 100,000	100,000 and Over
Current	243	186	207	273	243
Net working capital	32	30	34	35	29
Quick	51	35	38	61	56
Worth-to-debt	185	114	137	197	190
Turnover of trade debt[a]	21	29	25	17	21

SOURCE: *Quarterly Financial Report for Manufacturing Corporations,* FTC-SEC.

[a] Trade-payables-to-sales ratio.

$5 million in assets was more than four times as great as that on bonds of firms with assets of $100 million and over.

Age of Firm

Since the young firm is generally small, it possesses the attributes of smallness; but, unlike small firms which have endured, the young firm is further handicapped by lack of experience. Young firms therefore represent a higher degree of risk than is attributable to size alone.

Support for the proposition that credit risk is a function of age and a rough estimate of the ranking of risk by different ages are available from the loss experience of the Reconstruction Finance Corporation,

studies of business mortality, and Dun & Bradstreet failure data and credit ratings.

The RFC data permit a comparison between size and age criteria as quality determinants.[6] The loss experience on loans extended to groupings of firms of small size can be compared with the experience on loans extended to newly organized firms and firms less than three years old at the time of the loan. Loans to firms with assets of less than $5,000 were riskier than loans to newly established firms. Firms in the $5,000-$24,000 asset-size class also performed more poorly on the basis of all loans than did young firms. On the basis of extinguished loans, however, newly established firms were a greater risk. But these size breakdowns are extremely small. Based on the $25,000-$49,000 asset-size class, which is still very small business, size is less of a risk factor than age. Indeed, these data indicate that it is more than twice as risky to lend to a new firm than it is to lend to one in the $25,000-$49,000 asset class.

Many prewar studies were made of the life expectancy of firms. They did not show clearly that credit loss is correlated with the age of the debtor firm, but they did indicate that the young concern is a risky proposition for the creditor.[7] The Department of Commerce studies of the life expectancy of firms are the most comprehensive made to date.[8] The Commerce definition of age is limited, however, in that it refers to the length of time a firm has operated under the same ownership; hence "newly acquired" refers to both newly established and transferred firms. A firm whose ownership is transferred has a lower probability of failure than one that is newly established, since the transferred firm has lines of supply, credit connections, and a clientele. Mortality figures are also deceptive in that they convey the impression of credit losses when in fact mortality, as defined by the Department of Commerce, does not

[6] Saulnier, *et al.*, *Federal Lending*.

[7] Most of the findings of these prewar studies have been summarized in *Problems of Small Business*, TNEC Monograph 17, Washington, 1941.

[8] Betty C. Churchill, "Survival Patterns of the Postwar Business Population," and "Age and Life Expectancy of Business Firms," *Survey of Current Business*, December 1952 and December 1955.

necessarily mean a failure but may simply be the result of a transference of ownership. These shortcomings limit the development of true mortality rates from the available data.

Table 35, however, provides an estimate of the relative ranking of risk by the age of firms and also permits a rough approximation of the degree of credit risk at selected ages, especially for the early years of a firm's existence. These findings indicate that in the early years of a firm's life the probability of demise is greatest in the retail sector and least in the wholesale sector. In the fourth year of establishment, life expectancy is equal for manufacturing and retail firms. After the eighth year, firms in all sectors have equal chances of survival.

The difference in life expectancy among sectors is probably attributable to ease of entry. Since the retail sector requires the least amount of capital and experience, it attracts the largest number of hopeful entrepreneurs. Through numbers alone, the competitiveness of the retail sector is intensified. Since most newcomers die early, the mortality rate of the retail sector rapidly approaches the experience of the other sectors as age of firm increases.

Table 35 shows the proportion of existing firms of a given age that will survive an additional year. Of all newly established firms, only 66 per cent will last through one year, in contrast to 95 per cent of firms that are eight years old. Survival for one more year becomes an increasing likelihood as the firm survives each additional month. The experience of all firms in 1947-54 shows that when a firm is first established, its life expectancy is twenty-one months. If it survives its first six months, its life expectancy improves to twenty-seven months. A firm surviving 2.5 years has a life expectancy of an additional 6.75 years.[9]

It seems reasonable to assume that timing plays an important role in the life expectancy of firms, i.e., at what point of the business cycle and at what stage in the development of the industry the firm is born. The behavior of estimates of average life expectancy seems to be comparable for very different periods. However, the probability of success or failure for any firm, or the dispersion around the average at any given moment, is a function of the number of firms already in existence, the rate of innovation, consumer demand, and many other factors.

[9] *Survey of Current Business*, December 1955, Table 3, p. 18.

TABLE 35

PERCENTAGE OF FIRMS OF SPECIFIED AGE SURVIVING AT LEAST ONE ADDITIONAL YEAR

Age (years)	All Industries	Mining and Quarrying	Contract Construction	Manufacturing	Wholesale Trade	Retail Trade	Services
0	66	67	72	71	76	62	65
1	73	74	79	75	81	70	73
2	79	79	85	80	85	77	79
3	85	84	89	84	88	84	84
4	89	87	92	88	91	88	89
5	91	89	93	90	93	90	91
6	93	91	94	92	94	92	93
7	94	93	95	93	95	93	94
8	95	94	95	94	95	94	95
9	95	95	96	94	96	95	95

SOURCE: *Survey of Current Business*, December 1955, Table 3, p. 18. Based on 1947-54 experience.

Trends in Quality of Trade Credit by Size and Profitability of Firms

One of the most important and most difficult patterns to establish for qualitative analysis is the distribution of trade credit and trade debt by size of firms. This information is readily available for corporations, but without data on unincorporated firms the pattern of distribution is grossly distorted. Information on unincorporated firms is available only since 1957. Table 36 compares the trade credit distribution pattern for corporations with "all" firms (including estimates for unincorporated firms) in 1957.

To obtain the size distribution of trade credit and trade debt of unincorporated firms, their respective totals for 1957 were divided among the different size classes according to the known size distribution

TABLE 36

PERCENTAGE DISTRIBUTION OF TRADE CREDIT, TRADE DEBT, AND SALES BY SIZE OF FIRM WITHIN SECTORS FOR CORPORATIONS AND ALL FIRMS, 1957

	Small		*Medium*		*Large*		*Giant*		*Total*	
	Corps.	All	Corps.	All	Corps.	All	Corps.	All	Corps.	All
					MINING					
Trade credit	16	30	23	20	19	16	41	34	100	100
Trade debt	23	39	19	17	17	13	41	31	100	100
Sales	17	31	22	20	19	16	42	34	100	100
					MANUFACTURING					
Trade credit	13	15	12	12	20	19	56	54	100	100
Trade debt	16	19	11	12	16	15	57	54	100	100
Sales	14	17	13	13	19	18	54	52	100	100
					WHOLESALE					
Trade credit	17	30	25	24	23	18	35	28	100	100
Trade debt	18	32	25	24	21	17	36	28	100	100
Sales	20	34	26	25	23	18	31	24	100	100
					RETAIL					
Trade credit[a]	—	—	—	—	—	—	—	—	—	—
Trade debt	18	62	39	18	12	6	31	14	100	100
Sales	13	53	38	21	12	7	36	19	100	100
					SERVICES					
Trade credit[a]	—	—	—	—	—	—	—	—	—	—
Trade debt	17	40	23	21	25	17	35	22	100	100
Sales	25	49	26	22	26	16	23	14	100	100
					CONSTRUCTION					
Trade credit	7	18	22	28	43	33	29	20	100	100
Trade debt	11	24	28	34	40	29	20	13	100	100
Sales	15	28	30	36	35	24	21	12	100	100

NOTES TO TABLE 36

SOURCE: Shown are the distributions of trade credit, trade debt, and sales by the size of corporation as reported in the Treasury *Source Book,* and their size distribution for corporate and unincorporated firms combined ("all"). Unincorporated data were allocated on the basis of the size distribution of sales of proprietorships, and partnerships reported in a supplement to the Statistics of Income, *U.S. Business Tax Returns-1957,* Internal Revenue Service.

NOTE: The sum of the size groups may not equal 100 per cent due to rounding. See Appendix A for the asset range of the size classes of each sector.

[a] Consumer credit could not be removed on a size-class basis. See Chapter 2, footnote 1.

of unincorporated sales for that year.[10]

A straight-line allocation of the trade credit and trade debt of unincorporated firms based on the size distribution of sales is in itself inaccurate. Nevertheless, the "all" column in Table 36 gives the best available picture of the relative importance of firms of different size as holders of trade credit and trade debt outstanding. Because consumer credit could not be separated from the receivables of the retail and service sectors on a size-class basis (even for corporations), the size distribution of their trade credit is not included in the table.

It is not possible to determine with any precision the extent to which the share of trade debt owed by small firms altered in 1947-57. But judging from the stability of the share of trade debt held by small corporations and the fact that the rate of entry of new firms has been comparatively low and stable since 1949, it appears that changes in the share of trade debt owed by small firms were not a source of substantial change in the quality of trade credit since 1949. In the 1945-49 period, however, the rate of entry was unusually high, with the result that changes in the share of trade debt owed by small firms was an important qualitative factor.[11]

[10] *U.S. Business Tax Returns—1957,* Internal Revenue Service. This was the first annual report on proprietorships and partnerships to be published as a supplement to the *Statistics of Income.*

[11] Between 1945 and 1950, the business population increased by about a million firms. In the subsequent five-year period, 1951-55, the business population increased by only about 170,000 firms. In both periods approximately 90 per cent of the new firms were unincorporated. (*Survey of Current Business,* April 1955, Table 1, p. 15.)

TABLE 37

TRADE CREDIT, TRADE DEBT, SALES, AND ASSETS OF CORPORATIONS WHICH EARNED NO NET INCOME AS A PERCENTAGE OF ALL CORPORATIONS, BY SECTOR, 1957

	1957	Change in Percentage Points, 1947-57
	ALL SIX SECTORS	
Trade credit	13	+ 6
Trade debt	17	+ 6
Sales	12	+ 6
Assets	12	+ 5
	MINING	
Trade credit	22	+12
Trade debt	35	+15
Sales	20	+12
Assets	27	+14
	MANUFACTURING	
Trade credit	9	+ 3
Trade debt	12	+ 3
Sales	10	+ 5
Assets	9	+ 3
	WHOLESALE	
Trade credit	14	+ 7
Trade debt	17	+ 7
Sales	13	+ 6
Assets	13	+ 5
	RETAIL	
Trade credit	17	+ 9
Trade debt	24	+13
Sales	17	+11
Assets	18	+12
	SERVICES	
Trade credit	21	+ 6
Trade debt	30	+ 8
Sales	21	+ 8
Assets	26	+12
	CONSTRUCTION	
Trade credit	19	+ 5
Trade debt	22	+ 6
Sales	15	+ 5
Assets	18	+ 4

SOURCE: Treasury *Source Book*.

Distribution of Debt by Risk Characteristics

TABLE 38

TRADE DEBT OWED BY UNPROFITABLE CORPORATIONS, 1957 AND 1960

Sector	*Million Dollars*		*As Percentage of Total Trade Debt in Sector*	
	1957	1960[a]	1957	1960[a]
Mining	403.5	442.3	34.5	40.1
Manufacturing	2,477.4	3,978.7	12.5	16.5
Wholesale	1,432.8	1,898.8	17.4	19.0
Retail	1,234.3	1,745.3	23.8	26.4
Services	544.0	668.7	30.3	29.9
Construction	582.4	1,380.0	22.5	33.2
Total	6,674.4	10,113.8	17.2	21.0

SOURCE: *Statistics of Income.*

[a] Preliminary.

A final pattern of distribution distinguishes between firms which earned a net income and those which did not. In the absence of balance-sheet data for unincorporated firms, Tables 37 and 38 are based solely upon corporations.

From the combined experience of the six major sectors, it is seen that 17 per cent, or $6.7 billion, of the trade debt owed by nonfinancial corporations in 1957 was owed by those which were not profitable. This was an increase of 6 percentage points over 1947. In 1957-60 the percentage rose another 4 points to 21 per cent. Within sectors the experience varied. Mining had the largest proportion of trade debt owed by unprofitable corporations in 1957 and the largest increase over 1947; the manufacturing sector had the lowest proportion and the lowest increase in the share owed by unprofitable corporations. More recently, Table 38 shows that the construction sector is rapidly becoming the area of highest risk based on the criterion of unprofitability.

More significant, qualitatively, is the fact that by 1957 a substantial and increasing proportion of the trade debt of small firms was owed by those which earned no net income (Tables 39 and 40). Thus, while

TABLE 39

SHARE OF TRADE DEBT OWED BY SMALL AND UNPROFITABLE FIRMS, 1957
(per cent)

	Proportion of Trade Debt in Sector Owed by Small Firms, 1957[a]	*Proportion of Trade Debt in Small Size Class Owed by Unprofitable Corporations*[b]	
		1957	Change in Percentage Points, 1947-57
Mining	39	61	+22
Manufacturing	19	32	+ 6
Wholesale	32	31	+10
Retail	62	48	+19
Services	40	54	+10
Construction	24	48	+ 6
Total	34	37	+10

[a] See Table 36. Includes corporate and unincorporated business. Data not available for earlier years.

[b] Based on corporate data. The same proportions can be applied to unincorporated firms, since the proportion of unprofitable sales does not vary significantly for unincorporated firms in several sectors and for all combined. See Appendix Table A-2. Annual proportions of trade debt owed by unprofitable corporations by size class is shown in Table 40.

approximately 34 per cent of the trade debt of the six major sectors was owed by small firms in 1957, about 37 per cent of this proportion was in the hands of small unprofitable firms. These firms, therefore, owned about 13 per cent of the trade debt of the six major sectors in 1957. In dollar terms, this meant that approximately $6.8 billion in trade credit had been extended to firms of the highest risk.

Although the share of unprofitable firms shown in Tables 39 and 40 is based on corporate data, available evidence permits us to assume that it is about the same for unincorporated as for corporate firms (see Table A-2).

Two points should be kept in mind in considering this evidence:

Distribution of Debt by Risk Characteristics

TABLE 40

PROPORTION OF TRADE DEBT OWED BY UNPROFITABLE CORPORATIONS WITHIN EACH SIZE CLASS, ALL MAJOR SECTORS COMBINED, 1947-57

(per cent)

	All Corporations	Small	Medium	Large	Giant
1947	10.7	27.1	12.3	7.3	4.6
1948	11.0	33.1	15.1	6.6	2.2
1949	15.7	39.1	21.3	11.6	4.1
1950	9.5	27.7	13.1	5.9	1.9
1951	11.0	30.9	16.4	9.0	2.4
1952	11.7	—	—	—	—
1953	13.1	35.3	21.3	13.0	2.3
1954	17.0	37.6	23.9	16.4	6.7
1955	13.0	32.7	18.3	12.0	4.1
1956	13.2	33.8	19.6	12.7	3.4
1957	17.2	37.0	24.1	15.6	7.4

SOURCE: Treasury *Source Book*. Includes mining, manufacturing, wholesale, retail, service, and construction sectors.

firms that are unprofitable one year may be profitable the next, and owners of small firms are reputed to draw part of their profits in the form of high salaries. However, the rising trend of unprofitability and the low and declining capital position of small firms in this period (see Table 25) make their share of trade debt a matter of concern and indicate the need for continuous surveillance.

There are no data on the age distribution of trade debtors. However, there is evidence that the age factor declined as a source of credit risk in 1947-57. As has been noted, the entry rate for the economy was halved between 1946 and 1952 (Table 41); in addition, the median age of all firms rose from 2.75 years in 1947 to 6.75 years in 1954. Table 42 shows that similar increases in the median age of firms took place in each sector.

TABLE 41

ENTRY RATE PER 10,000 FIRMS, 1946, 1949, AND 1952

	1946	1949	1952
All industries	1,900	830	880
Mining	1,450	960	1,130
Manufacturing	2,380	800	870
Wholesale	2,160	810	820
Retail	1,610	760	770
Services	1,900	780	740
Construction	4,780	1,600	1,770

SOURCE: *Survey of Current Business,* January 1954, p. 14.

TABLE 42

MEDIAN AGE OF FIRMS, 1947 AND 1954
(years)

	1947	1954
Mining	5.50	7.50
Manufacturing	3.25	7.50
Wholesale	3.00	7.25
Retail	2.25	6.00
Services	3.25	7.75
Construction	1.50	5.00
All industries	2.75	6.75

SOURCE: *Survey of Current Business,* December 1955, Table 4, p. 19.