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Volume Author/Editor: Martin H. Seiden

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Chapter Author: Martin H. Seiden

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Measuring Trade Credit Quality: Credit Ratings[1]

Credit ratings play an important role in guiding the credit policies of trade lenders. They also represent the most current information on the quality of existing and potential business credit. Samples of rated firms should, therefore, be useful in measuring changes in trade credit quality. This chapter describes the results of samples of firms that were rated in 1950-58, and analyzes the reliability of credit ratings as a predictor of credit difficulties.

Sources of Ratings

Dun & Bradstreet is the nation's largest and most diversified source of credit ratings. Its bimonthly *Reference Book* lists approximately three million firms, both corporate and unincorporated. The firm operates through 158 offices in the United States and Canada, employing a staff of 2,000 full-time reporters supplemented by 20,000 part-time correspondents. This extensive coverage includes interviews of a substantial proportion of the listings at least once a year, in addition to the financial and operating information supplied by the listed firms. The Dun & Bradstreet files are hence the most detailed and up-to-date record of the financial and operating condition of American business now available. In addition to the direct investigation of firms, Dun & Bradstreet annually receives over 22 million evaluations by suppliers of their trade experiences with customer firms.[2]

The *Reference Book* covers most nonagricultural and nonfinancial firms with the exception of services, the professions, and nonprofit insti-

[1] This chapter is based on a study made for the NBER by Victor Zarnowitz. See his report in Thirty-Ninth Annual Report of NBER, May 1959, pp. 59-62.

[2] *Instruction Manual,* New York, Dun & Bradstreet, Inc. 1956, Chap. IX, p. 20.

tutions. The listings are arranged alphabetically by state, locality within the state, and name of firm. Each firm is listed with its four-digit Standard Industrial Classification Code number, a line of business designation, and a notation indicating whether the listing is new or whether the credit rating has been changed since the previous book was published. If the concern is less than ten years old, its date of establishment is included. Over 70 per cent of the listings are accompanied by an estimate of the financial strength of the firm and a composite credit rating.

By sampling listings in the *Reference Books*, it is possible to focus upon a wide variety of problems. With the proper stratification, probability samples can be obtained based upon selected lines of business, geographical locations, firms of different age, size, corporate and unincorporated forms, or combinations of these and other characteristics. In addition, the information provided is current since a substantial proportion of the names listed are reviewed in every twelve-month period and revised when warranted.[3]

Dun & Bradstreet uses the following method for rating firms. The "blank" classification denotes firms for whom a composite credit rating was not feasible because there was insufficient information. It also includes firms for whom the information available disclosed financial weakness of hazardous proportions, an undue moral risk, litigation critical to the business, or other circumstances of similar import. "High" indicates a minimum credit risk. Lying between the "blank" and "high" categories are "good," "fair," or "limited." The "limited" rating is applied principally to small firms with substantial and chronic deficiencies.

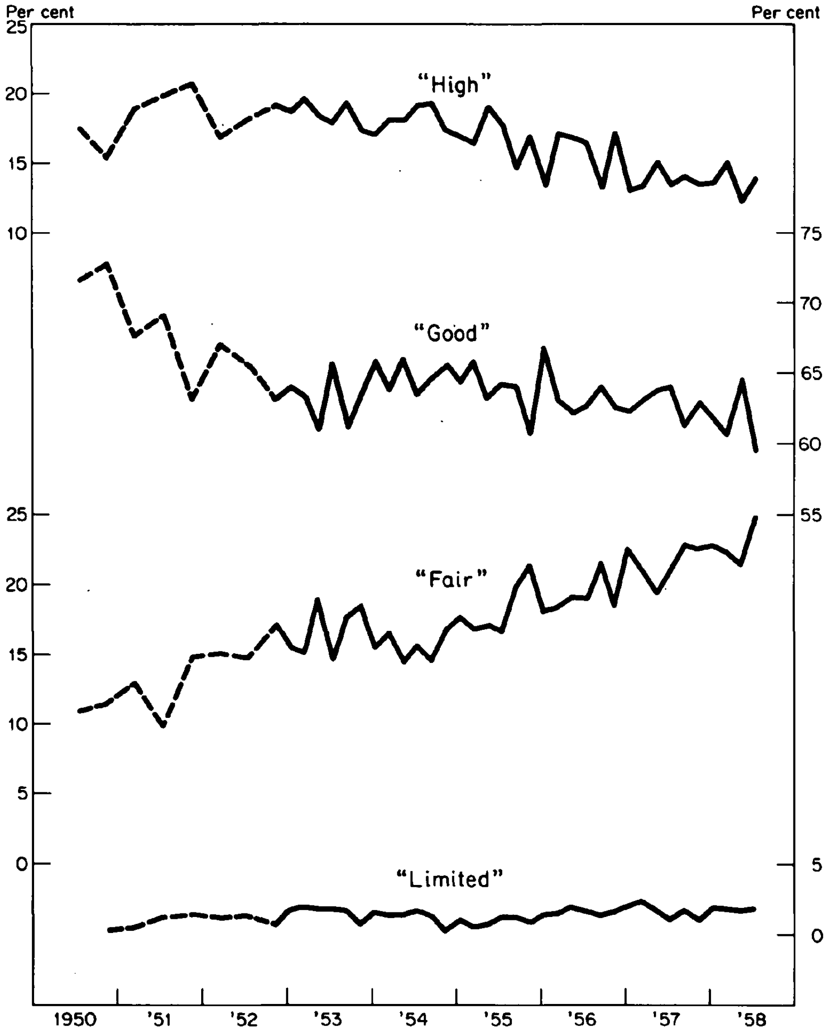
Credit Ratings and Qualitative Change

The following experiment utilizes changes in the proportion of firms in the different rating categories to indicate the trend in credit quality. Thus, a rise in the proportion of firms in the lower rating categories (limited or fair) indicates a deterioration in the quality of trade credit. Samples, each of about 1,200 listings, were drawn at random from eight

[3] In January 1962 the *Reference Book* had 2,914,497 names listed. Of these, 420,728 were new names added in 1961. The same year 494,522 names had been removed. Changes in the ratings of 678,455 firms, or 23 per cent of the listings, had been made in 1961.

CHART 10

Percentage Distribution of Firms by Credit Rating, 1950-58



bimonthly volumes of the Dun & Bradstreet *Reference Book* for 1950 through 1952 and from all thirty-four volumes covering January 1953–July 1958.

The samples show that between 1950 and 1958 there was an upward shift in the proportion of firms in the limited and fair categories (Chart 10). Since the incidence of low ratings is shown later in this chapter to be particularly high among young firms, an increase in the relative frequency of these firms could be responsible for the observed increase. However, the proportion of new concerns in the total business population, according to Department of Commerce estimates, remained stable throughout the period. The proportion of firms in young age groups, according to the *Reference Book* samples, was likewise stable, subject only to mild short-period oscillations. In fact, the upward movement in the percentage of limited and fair ratings was not limited to any particu-

TABLE 28

COMPOSITION AND CHANGE IN CREDIT RATING, 1950-58 AND 1952-58

TYPE OF FIRM	FIRMS RATED "HIGH" OR "GOOD": *Per Cent of All Ratings* July 1950	July 1958	Per Cent Change	FIRMS RATED "FAIR" OR "LIMITED": *Per Cent of All Ratings* July 1950	July 1958	Per Cent Change
All firms:	89.1	73.3	–18	10.9	26.7	+145
Small	89.5	68.7	–23	10.5	31.3	+198
Large	90.0	83.1	– 8	10.0	16.9	+ 69
Young	83.1	69.4	–17	16.9	30.6	+ 81
Old	91.1	76.3	–16	8.9	23.7	+166
Small size:						
Young	88.2	65.0	–26	11.8	35.0	+197
Old	89.6	75.0	–16	10.4	25.0	+140
Medium size:						
Young	82.7	66.7	–19	17.3	33.3	+ 92
Old	91.4	69.3	–24	8.6	30.7	+257
Large size:						
Young	81.8	77.5	– 5	18.2	22.5	+ 24
Old	91.3	84.6	– 7	8.7	15.4	+ 77

(continued)

TABLE 28 (concluded)

	FIRMS RATED "HIGH" OR "GOOD"			FIRMS RATED "FAIR" OR "LIMITED"		
	Per Cent of All Ratings		Per	*Per Cent of All Ratings*		Per
SECTOR	Nov. 1952	July 1958	Cent Change	Nov. 1952	July 1958	Cent Change
Manufacturing	81.7	79.2	− 3	18.3	20.8	+ 14
Durables (mfg.)	77.5	77.8	—	22.5	22.2	− 1
Nondurables (mfg.)	84.9	81.2	− 4	15.1	18.8	+ 24
Wholesale	88.9	76.2	−14	11.1	23.8	+114
Retail	80.6	73.6	− 9	19.4	26.4	+ 36
Services	86.5	68.3	−21	13.5	31.7	+135
Construction	80.0	69.6	−13	20.0	30.4	+ 52

SOURCE: Zarnowitz' samples of Dun & Bradstreet *Reference Books*. See Appendix C.

lar grouping of firms. It may be concluded that this measure points to a widely diffused deterioration of creditworthiness.

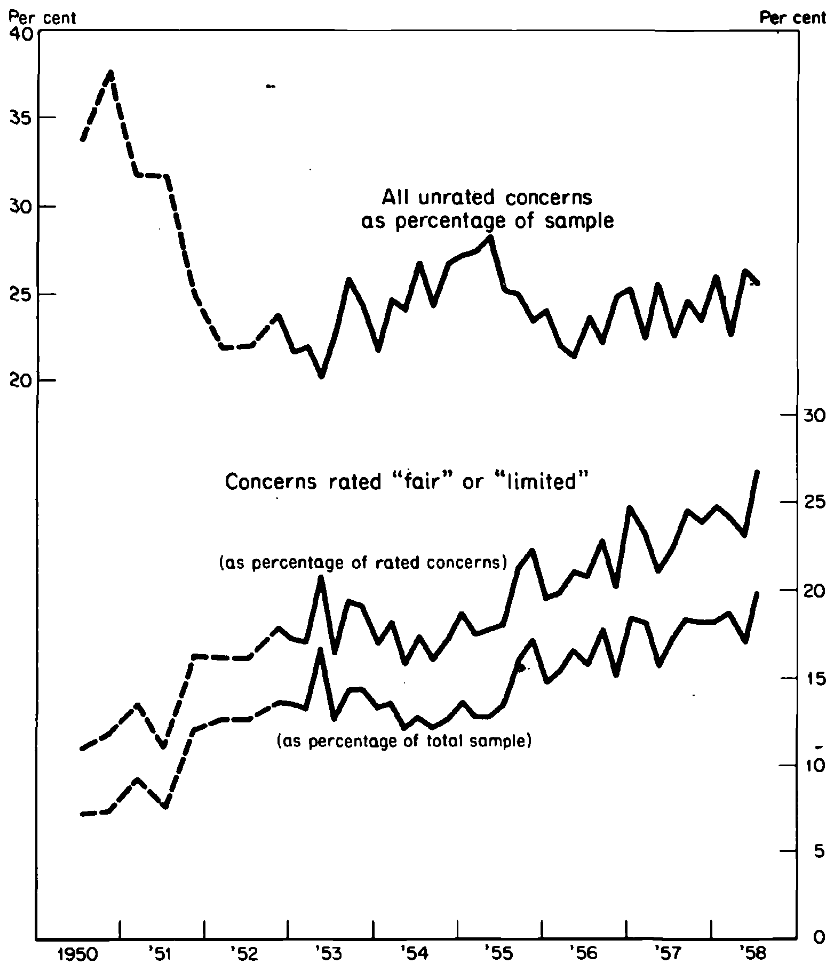
The extent of the qualitative decline in 1950-58 is summarized in Table 28. The proportion of firms with ratings of high and good declined by about one-fifth. By 1958, 26.7 per cent of the sampled firms were in the limited and fair categories, compared with 10.9 per cent in 1950 (Chart 10).

These findings are based on samples of *rated* firms, which comprise about 70 per cent of the listings in the *Reference Book*. The conclusion would not be different, however, if the series were based on total listings, i.e., including nonrated or "blank" firms. This is illustrated by the parallel movement of the limited and fair series when computed with and without unrated firms, as shown in Chart 11.

Although the decline in credit quality as judged by the ratings was widely diffused, the extent of the decline varied considerably among different types of firms. Thus small, young firms (net worth under $2,000 and less than five and a half years old) underwent the greatest decline

CHART 11

Percentage of Unrated Concerns and Fair or Limited Ratings, 1950-58



in credit ratings (Table 28). This group also had the largest proportion of firms in the limited and fair rating category in 1958. Credit ratings declined least among larger firms (net worth over $20,000).

Validity of Credit Ratings

It was possible to test the prognostic ability of credit ratings as a measure of the quality of trade credit by the experience of the Reconstruction Finance Corporation and the American Credit Indemnity Company. The generally inverse relationship between defaults and ratings found in the RFC experience attests to the prognostic ability of credit ratings. Their loss rates, however, were less consistently a function of the ratings.[4]

In credit insurance, the structure of premium rates is supposed to reflect the differential risk of loss among rating categories. The insurers of trade credit, the American Credit Indemnity Company and the London Guarantee and Assurance Company, employ Dun & Bradstreet's ratings as the basis of their estimates of risk. They anticipate higher losses on trade credit extended to those customers with lower ratings and also, within a given rating category, to those with lower net worth.

The rate structure outlined in Table 29 shows the steep rise of premium rates from the highest to the lowest ratings in each net worth group and also in the higher rates for concerns with smaller net worth in the high and good categories. There is no differentiation in the rates on trade credit extended to firms in the fair and limited categories; the premiums, however, are substantially higher than those required for trade credit extended to better-rated firms. Furthermore, losses on trade credit extended to the two lowest-rated groups are generally reimbursed on the basis of 80 per cent of the invoice price rather than the 90 per cent basis that generally applies to the two highest-rated groups. This is termed 20 per cent and 10 per cent "coinsurance," respectively. An annual normal loss expectancy, called "primary loss," is also deducted from losses before actual payment.

Any account not listed in Table 29 can be insured whether or not it has a credit rating. On these accounts, however, there is generally a blanket provision limiting coverage to $3,000 to $4,000 per debtor, the maximum being $10,000, and the higher coinsurance rate applies. Additional coverage of these accounts requiries special credit analysis,

[4] R. J. Saulnier, H. G. Halcrow, and N. H. Jacoby, *Federal Lending and Loan Insurance*, Princeton for NBER, 1958, pp. 449, 458, 464, 471.

TABLE 29

CREDIT INSURANCE PREMIUM RATES AND GROSS COVERAGE, BY CREDIT RATING AND NET WORTH OF DEBTORS

Net Worth (thousand dollars)	*Premium Rates on $1,000 of Coverage[a] (dollars)*		*Maximum Open Coverage[b] (thousand dollars)*	
	High	Good	High	Good
500 and over	3	14	50-100	25
125 to 500	4	15	50	25
Estimated at over 125	5	15	50	15
35 to 125	6	20	20-30	10-15
10 to 35	7	30	5-10	3-5
1 to 10	10	30	.5-2.5	.5-1.5

SOURCE: *Standard Manual,* American Credit Indemnity Company. The credit rating and net work classifications are those of Dun & Bradstreet. The fair, limited, and blank rating categories are not shown as they come under special arrangements. See text.

[a] Premiums shown are for the single highest account in each rating and net worth category. Smaller accounts are automatically covered.

[b] To simplify this presentation, Table 29 combines from two to four credit rating groups in each premium and net worth category. Each such subgroup has its own maximum coverage per account. This explains the range of maximum coverage shown for some cells.

and special arrangements are possible through the use of "riders."[5] The insurers are also selective in their choice of clients which is an additional

[5] A policyholder who desires to extend trade credit beyond the volume ordinarily covered for a particular debtor's rating and financial strength can purchase additional coverage by means of a rider naming the specific debtor and the increased coverage. The additional coverage is subject to the lower coinsurance rate of 10 per cent.

Another variation in the application of the table of premiums and ratings is the case of depressed industries, where insurance may be severely restricted or withheld entirely. On the other hand, lower premiums are not granted to users of credit insurance who sell to those lines of business where credit losses are known to be particularly low. Variation (and the lack of it) from the standard premium structure helps to explain some of the divergences that appear in the loss-to-premium ratios.

variant to be considered in evaluating their loss-to-credit-rating experience.

To the extent that the ratings and premiums satisfactorily anticipated the losses, the loss-to-premium ratios would be the same for all rating and net worth categories. Deviations from equality indicate that either the premiums or the ratings are not properly adjusted to the probability of credit loss. It appears from the loss-to-premium ratios that premiums, as well as the credit ratings upon which they are based, measure the relative quality of the credit rather well. The average loss-to-premium ratios for all sizes of debtors show only a moderate variation between the different groups of credit ratings. The percentages are 22, 29, and 31 for accounts rated high, good, and fair, respectively, in 1952-57.

However, when reading down the columns, comparing the different net worth groups under a given credit rating category, the ability to measure risk appears to be weak. But, as has already been noted, part of the weakness in this relationship may be attributable to the policies of the insuring companies vis-à-vis particular lines of business and the inflexibility of the premiums rates applied to low-loss sectors.

The ratio of losses to premiums differs from that of losses to coverage. Optimally, the loss-to-premium ratio which we have been discussing should be equal for different credit ratings, but the loss-to-coverage ratio should vary inversely with credit ratings. The insurer's data show that the loss-to-coverage ratio had the expected regression pattern in 1952-57. It rose steeply from high to low credit ratings, being .09 per cent for firms rated high, .50 for those rated good, and 1.84 per cent for firms rated limited and fair. This pattern is confirmed by the behavior of the loss-to-coverage ratio for different-size firms within the high and good categories. Here, incidentally, it appears that small firms rated high performed better than large firms rated good.

A final example of the prognostic ability of credit ratings is provided by another source. An analysis of the National Credit Office's experience in evaluating the creditworthiness of firms is given in Table 30. A review of the past credit ratings of forty-six firms which were in financial straits in May 1955 showed that N.C.O.'s quarterly reports had anticipated the difficulties by two years in 13 per cent of the cases and by one year in 73 per cent.

In conclusion, credit ratings appear to provide effective estimates of the potential risk inherent in the extension of trade credit, although further tests of their prognostic accuracy would be desirable.

TABLE 30

PRIOR CREDIT RATINGS OF FORTY-SIX COMPANIES IN FINANCIAL DIFFICULTIES IN MAY 1955

	Cumulative	
Quarter Preceding Credit Difficulties	Number of the 46 Firms for Which Difficulties Were Predicted	Number of the 46 Firms Rated in That Quarter
8th quarter	7	9
7th quarter	13	16
6th quarter	25	28
5th quarter	30	35
4th quarter	34	40
3rd quarter	38	45
2nd quarter	39	46
1st quarter	41	46

SOURCE: National Credit Office, Inc.

Credit Ratings and the Size and Age of Firms

New avenues of measurement of credit quality would be opened if credit risk were found to be a function of objectively determinable characteristics of firms. It seems reasonable, in view of the prognostic ability of credit ratings, to look for these characteristics in a cross-sectional analysis of the ratings.

Table 31 shows that 28 per cent of small firms (net worth under $2,000) are rated limited or fair, while only 5 per cent of very large firms (net worth over $125,000) are in this class. There is thus a tendency for small firms to dominate the inferior credit ratings. Similarly, classification by age of firm (Table 32) shows that young firms are more heavily represented in the limited or fair group than are older ones.

TABLE 31

SUMMARY OF RELATIONSHIP BETWEEN CREDIT RATINGS AND SIZE OF RATED CONCERNS IN TERMS OF NET WORTH, ALL INDUSTRIES, JULY 1958

Net Worth[a] *(thousand dollars)*	*Composite Credit Appraisal*[b] Limited	Fair	Good	High	Total
			NUMBER OF CONCERNS		
Less than 2	4	12	39	1	56
2 to 20	10	152	322	23	507
20 to 125	1	56	151	56	264
125 and over	1	2	18	45	66
Total	16	222	530	125	893
		PERCENTAGE DISTRIBUTION BY CREDIT APPRAISAL			
Less than 2	7	21	70	2	100
2 to 20	2	30	64	4	100
20 to 125	[c]	21	57	21	100
125 and over	2	3	27	68	100
Total	2	25	59	14	100
		PERCENTAGE DISTRIBUTION BY NET WORTH			
Less than 2	25	5	7	1	6
2 to 20	62	68	61	18	55
20 to 125	6	25	28	45	30
125 and over	6	1	3	36	8
Total	100	100	100	100	100

SOURCE: Based on Zarnowitz' samples of Dun & Bradstreet ratings.

[a] The four net worth classes identified in this column are derived from the sixteen "estimated financial strength" groups of the Dun & Bradstreet classification. The smallest class combines the two lowest of the sixteen groups, the two intermediate classes consist of four groups each, and the largest class includes the six highest groups.

[b] The Dun & Bradstreet "Key to Ratings" distinguishes four credit appraisal categories which, combined with sixteen net worth groups, result in a system of sixty-four rating symbols classifying concerns by their estimated creditworthiness and financial strength.

[c] Less than 0.5 per cent.

TABLE 32

SUMMARY OF RELATIONSHIP BETWEEN CREDIT RATING AND AGE OF RATED CONCERNS, ALL INDUSTRIES, JULY 1958

Age of Firm[a] (years)	Composite Credit Appraisal				
	Limited	Fair	Good	High	Total
	NUMBER OF CONCERNS				
3½ or less	1	56	99	4	160
3½ to 5½	2	23	74	5	104
5½ to 9½	2	35	67	10	114
Over 9½	11	108	290	106	515
Total	16	222	530	125	893
	PERCENTAGE DISTRIBUTION BY CREDIT APPRAISAL				
3½ or less	1	35	62	2	100
3½ to 5½	2	22	71	5	100
5½ to 9½	2	31	59	9	100
Over 9½	2	21	56	21	100
Total	2	25	59	14	100
	PERCENTAGE DISTRIBUTION BY AGE				
3½ or less	6	25	19	3	18
3½ to 5½	12	10	14	4	12
5½ to 9½	12	16	13	8	13
Over 9½	69	49	55	85	58
Total	100	100	100	100	100

SOURCE: Based on Zarnowitz' samples of Dun & Bradstreet ratings.

[a] Determined from data specifying only the last digit of the calendar year in which the firm was established. This information does not make it possible to identify the exact age of the firm in years. For example, in July 1958 a firm whose year of establishment is known to be 1954 would be approximately 4½ years old if it were founded in January 1954 but only 3½ years old if it were founded in December 1954. In this column, "3½" stands for the approximate range of "3 to 4 years," "5½" for "5 to 6," and "9½" for "9 to 10." In this sense, the age categories are of necessity not entirely determinate (and also subject to some shifts between samples for different periods).

Thus small and young firms emerge as greater credit risks than large and old firms. Chart 12 shows that, over time, younger firms have consistently had a smaller proportion of high or good ratings than older firms. Table 33 and Chart 12, which cross-classify firms by both size and age, show that the age factor becomes less of a differentiating influence in creditworthiness as firm size increases, which is to be expected since most big firms are also older ones.

To test the hypothesis that credit risk is an inherent function of the size of the borrowing firms and not the result of a selection bias built into the credit rating process, Zarnowitz conducted another experiment. Departing from the random probability samples, a separate, smaller sampling was made in which the identity of the selected firm was retained through time. The purpose was to see whether a firm whose size (net worth) had changed would have a change in rating. To reduce the complexity of the problem, changes in credit rating (and net worth) were classified on the basis of three characteristics: improvement (increase), worsening (decrease), and no change.

It was found that most of the increases or decreases in net worth of firms were not accompanied by a change in credit appraisal, although in those instances where both worth and rating did change, they were more frequently positively than negatively correlated. There were, however, numerous instances in which the changes were inversely related. The highest frequency of change in credit rating took place among firms whose net worth had not changed at all (see Table C-6). Change in the size of firms appears to have had little direct influence on changes in their rating.

Ratings were also analyzed by industry. Interestingly, no pattern emerged. There was no consistency during 1952-58 in the qualitative ranking of the seven sectors: all manufacturers, manufacturers of durables and nondurables, wholesale, retail, service, and construction firms (see Table 28 and Appendix Table C-5). Apparently, risk is not inherently greater in some sectors than in others. More narrowly defined lines of business might provide different results, but the samples were not designed for greater detail.

CHART 12

Percentage of Firms Rated High or Good, by Age of Firm Within Net Worth Category, 1950-58

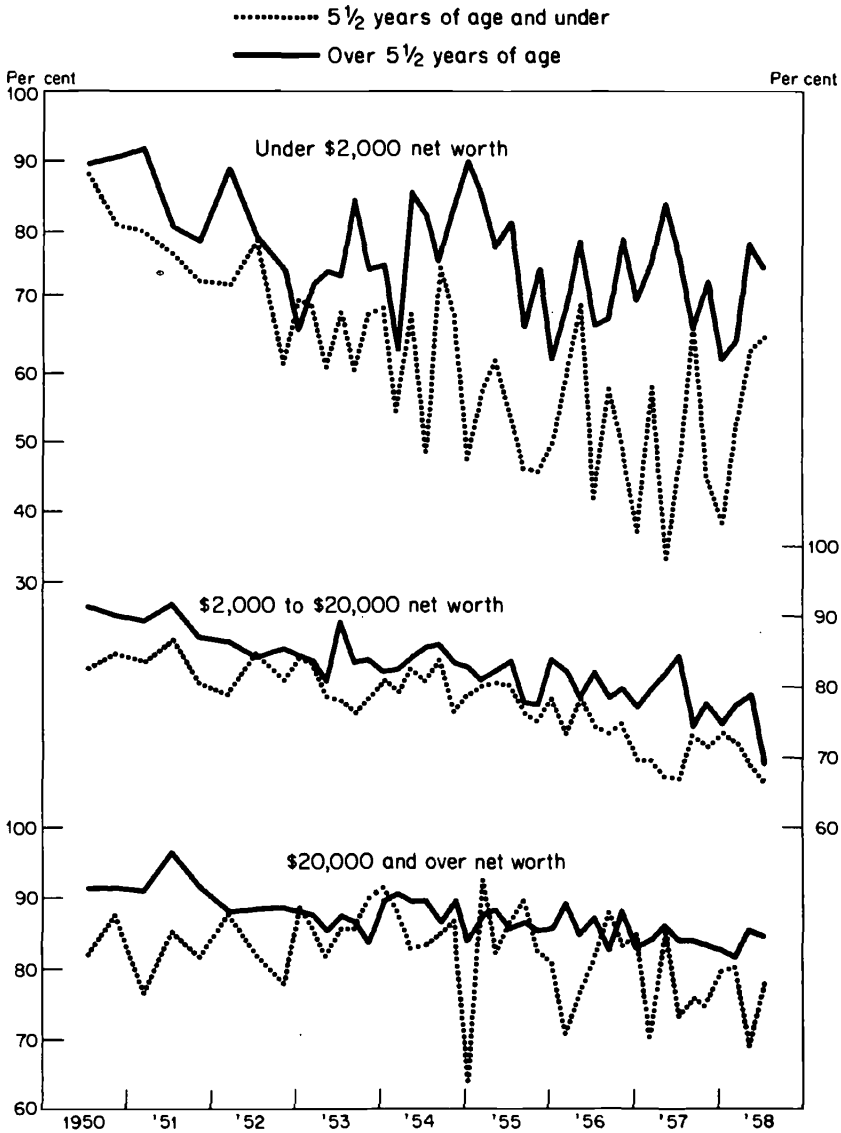


TABLE 33

PERCENTAGE DISTRIBUTION OF RATED CONCERNS BY CREDIT APPRAISAL AND AGE, FOUR NET WORTH GROUPS, JULY 1958

Age of Concern[a] *(years)*	*Number of Concerns Rated* Total	Limited or Fair	Good or High	*Within Age Group Percentage of Concerns Rated* Limited or Fair	Good or High
			LESS THAN $2,000 NET WORTH		
5½ or less	20	7	13	35	65
Over 5½	36	9	27	25	75
Total	56	16	40	29	71
			$2,000 TO $20,000 NET WORTH		
5½ or less	175	59	116	34	66
Over 5½	332	103	229	31	69
Total	507	162	345	32	68
			$20,000 TO $125,000 NET WORTH		
5½ or less	67	16	51	24	76
Over 5½	197	41	156	21	79
Total	264	57	207	22	78
			$125,000 AND MORE NET WORTH		
5½ or less	2	—	2	—	100
Over 5½	64	3	61	5	95
Total	66	3	63	4	96
			ALL CONCERNS RATED		
5½ or less	264	82	182	31	69
Over 5½	629	156	473	25	75
Total	893	238	655	27	73

SOURCE: Based on Zarnowitz' samples of Dun & Bradstreet ratings.
[a] See note a to Table 32.