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EARNINGS COVERAGE AND LIEN POSITION

UNDER most systems of security selection, including those based on the quality measures discussed in preceding chapters, attention is given either directly or indirectly to earnings coverage and to the nature of the lien on assets. The emphasis given these two factors in actual investment operations depends to a considerable extent upon the objectives of the investor, as well as upon his abilities. At the present time most security analysts (using that term in the sense in which it is customarily employed in large investment institutions) concern themselves primarily with the first of these two elements, or more specifically, with the problem of inferring default risk from data on past earnings, etc. Legal investment advisors in the larger investment institutions are concerned primarily with the second element: with the protection afforded by assets, or more narrowly, with the nature of the lien on assets, which becomes highly important after a default occurs. The two facets of the investment problem cannot be completely separated in practice, since primacy of the lien on assets frequently implies primacy of the claim on earnings, and vice versa. Nevertheless, the emphasis given them does differ under different investment programs. It is the purpose of this chapter to weigh the relative merits of these two approaches to investment safety, in so far as this may be done with data on past experience.

Since for outstanding issues the basic records on which this investigation rests contain no information on earnings coverage and lien position, the analysis is perforce limited to an appraisal of the performance of bond issues in the different categories at offering. It will appear from what follows that the coverage of the data on lien position at offering is excellent. Because of difficulties encountered in obtaining suitable income statements at offering, the coverage of the data on earnings is less complete, particularly for the early part of the century.

Subject to such limitations, the analysis will be developed along the lines of preceding chapters. After a brief summary of findings, two main sections follow, the first pertaining to earnings coverage as measured by the times-charges-earned ratio and by

the ratio of net income to gross income; and the second, to the lien position of the issue at offering, as determined by the type of security (secured or unsecured) and by rank of issue (i.e. whether the lien on assets was senior, intermediate, or junior to other issues). At the beginning of each principal section, the variables under consideration are defined and the limitations of the data are indicated. Thereafter follow a discussion of the percentage distributions of bond offerings by the respective variables, and an analysis of default rates and of average yields and loss rates on defaulted and nondefaulted issues.

SUMMARY OF FINDINGS

Earnings tests are regularly used by investors, rating agencies, regulatory authorities, and others as a means of ranking bond issues in order of exposure to the risk of default. The lien position of bond issues is also given careful consideration in an effort to protect the principal invested against the large losses that might otherwise occur in the event of a default. Despite important reservations to be brought out later in the chapter, our findings generally confirm the emphasis given to these two aspects of investment quality. Issues that had adequate earnings protection at offering usually went into default less frequently than those that did not have such coverage. Similarly, issues that had adequate asset protection at offering usually fared better in default situations than issues that were unsecured.

Data on the times-charges-earned ratio show a pronounced improvement in interest coverage on total bond offerings between 1900 and 1943, but on closer examination this is found to be largely a statistical mirage, since neither rails nor industrials showed any systematic movement although utilities had a slight upward trend. Financial information needed to compute the earnings ratios was more complete for railroads than other industries in the early part of the century, but rail bonds had the lowest times-charges-earned ratios at offering. Conversely, less financial information was available for the utilities and industrials in the early years, but those industries had the highest interest coverage at offering. The all-industries averages of the computed times-charges-earned ratios drifted upward as rail bonds declined in importance in total bond offerings, and as more information became available for utilities and industrials. Industry differences in "margins of safety" (ratios of net income to gross income) were

less pronounced, rails and industrials having similar ratios but lower than public utilities. The all-industries figures for the average margin of safety at offering therefore showed no pronounced trend.

More significant patterns are to be observed in the behavior of the earnings ratios over the shorter periods spanned by business cycles. Generally speaking, the average times-charges-earned ratio for bond offerings and the average ratio of net income to gross both reveal a moderate inverse conformity to general business cycles. Earnings coverage on bond offerings, calculated on the basis of average earnings over the five years preceding the offering, typically declined during early business expansions and rose during business contractions, thus providing additional evidence of the existence of a perverse credit cycle in the bond market. Two explanations for this phenomenon come to mind. One is that some investors (perhaps influenced by the upgrading and downgrading of outstanding issues by the investment rating agencies) may have been swayed more by current earnings than by long-run average earnings, in effect making it more difficult for marginal borrowers to obtain capital funds when business was contracting than when it was expanding. An alternative explanation is that during the period studied the better credit risks relied more on the bond market in times of stress, and on the stock market and other sources of capital funds in business expansions. While no attempt has been made to determine whether either or both of these explanations are correct, some support for the latter is provided by the fact that the total volume of funds flowing through the bond market from lenders to borrowers was inverted with respect to the general business cycle; that is, more funds were supplied on balance in business contractions than in expansions. This point and the relationship between bond and stock financing is discussed in *Volume of Financing*, pages 154–179.

The default record of corporate bond offerings classified by the two earnings ratios accords precisely with what has been intended in their use by investors. The times-charges-earned ratio and the margin of safety, whether considered individually or jointly, had a systematic bearing on the incidence of default. With great regularity, the larger the average number of times fixed charges were earned over the five years preceding offering, and the higher the ratio of net income to gross income, the greater was the protection afforded by future earnings, and the lower was the rate of default,

a finding that appears particularly striking in view of the long periods that may elapse between offering and extinguishment, and the myriads of events that may intervene to alter an obligor's ability to withstand a default.

The earnings ratios also behaved as expected for bond issues that went into default. The ratios are used by investors at offering to avoid defaults, and show no close relationship to the price and yield experience of the particular group of bond issues that happened to go into default. For the aggregate of all issues (defaults plus nondefaults), however, we again observe significant results. The earnings ratios are types of rating systems akin to those examined in preceding chapters, and show corresponding patterns of behavior among the bond issues rated. Here again the top grade issues generally had the lowest promised yields at offering, the lowest life-span yields realized from offering to extinguishment, and the lowest capital loss rates (or highest rates of capital gain). Conversely, the bottom grades had the highest promised yields and loss rates, and also the highest realized rates of return.

The relationship between lien position and corporate bond experience is roughly the reverse of that of earnings coverage, although industry differences were more important and frequently obscured the effects of the lien on the all-industries behavior. The "secured" issues (those backed by mortgage, collateral, or leasehold) were most important in the railroad field, and were least important in the industrial. Although the railroads rarely offered pure first mortgage bonds, they relied more heavily than other corporations upon secured issues ranking intermediate or junior to other issues. Contrariwise, the industrial group offered a larger proportion of unsecured issues (debentures) than other corporations; but so few were preceded by prior liens that industrials had the highest proportion of offerings ranking senior to or coequal with other issues.

Largely because of the growth of unsecured financing for industrial corporations during the period analyzed and the declining importance of the rails, there was a long-term downward drift in the proportion of secured offerings in the par-amount total of all offerings. Over business cycles, the secured offerings of the railroads conformed inversely, while the unsecured offerings conformed positively. Although the other industries exhibited positive or negligible conformity to the business cycle, the rails accounted for a sufficiently large proportion of secured offerings

to dominate the all-industries totals, which therefore conformed inversely. There is thus again some evidence of a perverse credit cycle in bond financing, the railroads offering larger proportions of secured offerings in business contractions than in business expansions. A possible explanation is that investors were more confident of the long-term outlook for railroad investments in good times than in bad, and took rail debentures only during business expansions.

The lien position of a bond issue may determine the position of the bondholders' claim on assets (and earnings) in the event of a default, but has little direct bearing on the degree of exposure to default risk at offering. Such differences as were observed in the default rates of bond issues classified by lien position at offering were related primarily to the types of issues customarily used by the different obligor groups and to the credit-worthiness of the principal issuers. In most periods unsecured issues could be floated only by corporations with a high credit standing, and such offerings had an excellent record with respect to subsequent default; but in periods when debentures were used by marginal concerns (e.g. in the 1920's when they were successfully floated by the pyramided public utility holding companies), unsecured offerings proved extremely liable to default. There is nothing in the records to indicate that lien position at offering had a significant effect on the incidence of default, when considered independently of the industry of the obligor, earnings coverage, and various other factors bearing upon the ability of the obligor to service funded debt.

A quite different situation obtained with respect to the price and yield experience of issues in the different lien position classes that happened to go into default. Almost without exception among the groups studied, unsecured issues had poorer records than secured issues as to cash payments after default, and had poorer life-span yield experience. From the evidence, secured issues generally fared better than unsecured issues in corporate reorganizations.

It is apparent from the foregoing that the over-all yield experience on secured as against unsecured issues in the different industry groups was largely governed by two factors: the relative frequency of defaults on the two types of issues; and the differential yield experience on issues that went into default. The net effect of these factors was that for large issues in the several industry

groups realized yields were higher on secured issues while for small issues they were higher on debentures.

To summarize, the yield experience on defaulted issues was generally in favor of the secured issues, but the degree of exposure to default risk was largely governed by other factors. The records show that adequate coverage as to earnings over a reasonable period preceding offering resulted in a low rate of subsequent default and that adequate security as to assets resulted in favored treatment after default.

EARNINGS COVERAGE

By all odds the most popular measure of earnings coverage is the times-charges-earned ratio, or the number of times that interest charges were earned by the obligor over some specified period preceding the offering (see, for example, pages 220 f., 224 f., and 229 f. for the use made of such ratios in the statutes defining the lists of securities eligible for savings bank investment in the different states; times-charges-earned ratios are also used by state insurance commissioners to determine whether or not securities are legal for investment by life insurance companies and are amortizable after purchase).[1] In addition to the times-charges-earned ratio, a number of other financial ratios are employed by security analysts, among the most important of which is the net profit margin, or so-called margin of safety, defined as the ratio of the net income of the obligor after fixed charges and taxes to the gross income from ordinary business operations.[2] These two ratios are examined in the present section for the light that they throw on the risk of default and on the yields obtained by investors who purchase corporate bonds at offering.

Nature of the Data

Times-charges-earned ratios such as are published in the investment manuals or used in drawing up the various legal lists are

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[1] *Final Report to Insurance Companies, Societies, and Associations* (National Association of Insurance Commissioners, 1953), pp. vii f.; also Section 81 of the Insurance Law of New York (Chapter 28 of the Consolidated Laws).

[2] The term "margin of safety" corresponds to Moody's usage in its manuals after 1942. It should not be confused with Moody's usage before 1929, which referred to the ratio of net income after fixed charges to net income before charges. (The earlier usage is redundant, since the margin of safety is then a simple function of the times-charges-earned ratio, viz., one minus the reciprocal of that ratio.)

often calculated by relating past earnings to past fixed charges (i.e. fixed charges excluding those reflecting new financing). In purchasing bonds at offering, however, the ratio is used to infer the protection afforded future fixed charges by earnings. For that purpose, it is usual to calculate the times-charges-earned ratio on a *pro forma* basis by estimating future fixed charges from the capital structure of the obligor after giving full effect to interest charges resulting from the new financing.

The estimation of future fixed charges is, of course, the only practical procedure for an investor contemplating the purchase of an issue at offering. For purposes of the present investigation, however, the more economical and accurate procedure was to relate actual fixed charges in the year following the offering to the average of earnings available for such charges over a specified period preceding the offering, thus avoiding the necessity for estimating *pro forma* charges. To reduce the effects of business cycles, earnings were averaged over the five-year period next preceding the offering.[3] The times-charges-earned ratio was computed only when earnings statements were available for the full five years preceding offering and for the year following offering; otherwise, the ratio was coded as "information lacking."

The numerator used in calculating the times-charges-earned ratios is the gross income of the obligor from all sources less all expenses and taxes (including federal income taxes), but before the deduction of fixed charges. As a practical matter, earnings available for fixed charges were most readily computed from the abbreviated financial statements published in the early part of the century by adding the fixed charges to the net income available for distribution to stockholders (common and preferred dividends plus retained earnings). Since income taxes are computed on the basis of income after charges and other taxes, only taxes other than federal income taxes are normally deducted to determine the amount available for fixed charges. In the present investigation, however, it was frequently not possible to obtain an adequate breakdown of taxes by type, so that for consistency of treatment all taxes were lumped together and deducted from

[3] In most cases, the practice of relating earnings over a five-year period preceding offering to fixed charges of the year following offering introduced a gap of one year between the last financial statement before and the first statement after the offering. An exception occurred when an issue was extended on the last day of a fiscal period (extended issues, it will be recalled, are treated as new offerings in this investigation).

net income. This procedure gives our ratios a conservative bias in that they underestimate the measure of protection afforded by earnings. (On similar reasoning, many security analysts calculate the ratio both before and after federal income taxes.) Except in wartime, however, federal income taxes were relatively light during the period studied. It has been estimated that the "effective tax rate" (country-wide federal corporate income tax liabilities as reported in *Statistics of Income* divided by compiled net corporate profits) was under 2 percent up to 1916, rose to 20 percent in 1917 and to just under 40 percent in 1918, dropped to a range between 11 and 18 percent in 1921–39, and rose again to just under 60 percent in 1943.[4] Except in war years, therefore, the conservative bias resulting from our treatment of taxes should not be exceptionally large.

"Fixed charges," as used in the denominator of the times-charges-earned ratio, include interest charges of any nature, whether on funded or unfunded debt; net rentals incurred for leased lines, terminal facilities, buildings, or equipment; and amortization of debt discount and preferred dividends of subsidiaries. In calculating fixed charges, net rental credits were disregarded, as were contingent charges such as interest on income bonds.

The "margin of safety" used in this investigation is the ratio of the net income available for distribution to stockholders (dividends plus retained earnings) to the gross income received from sale of products or services normal to the business operation, and before any deduction for expenses or charges. Gross income is the "Total Operating Revenue" of railroads and public utilities and the "Net Sales," "Total Sales," or "Total Receipts" of industrial enterprises. In calculating the ratio, nonoperating income was excluded from gross income but its contribution was included in net income. Both net and gross income were averaged over the five full years preceding the date of offering, and the ratio was not calculated unless financial statements for all of those years were available. On an assumption that costs and nonoperating income are completely rigid, the margin of safety would represent the maximum proportion by which total sales might shrink and fixed charges still be earned in full. The margin of safety or net

[4] The effective tax rates are from Sergei P. Dobrovolsky's *Corporate Income Taxation in the United States, 1909-1950* (National Bureau of Economic Research, ms.), Chapter 1 and Chart 1.

profit margin is regarded by many investment analysts as a more conservative and sensitive measure of earnings protection than the times-charges-earned ratio, particularly for highly cyclical industries.

Under the procedures followed in this investigation, the two earnings ratios were deliberately not calculated in certain cases. Income statements for years preceding a reorganization or merger were used only if they reflected earnings from substantially the same assets as were owned by the new or reorganized company. Earnings ratios were not computed for guaranteed issues nor for issues of companies obtaining the major portion of their income from rentals, since earnings statements in such cases usually do not reflect the true earning power behind the obligations. The ratios were also not computed for railroads when any of the requisite income statements fell within the period of federal government operation (July 1918 to September 1920), since the railroads were then in the position of lessors receiving guaranteed annual rentals equal to their average operating income over a prewar base period.[5] Since earnings statements were required for the full five years preceding offering for both earnings ratios, and for the year following offering for the times-charges-earned ratio, the exclusion of the period of federal operation means that the ratio of net income to gross income was not calculated for railroad bonds offered in the years 1919–25, and that the times-charges-earned ratio was not calculated for the years 1917–25; however, the ratios were calculated in those years for industries providing services incidental to railroads (and included in our railroad group) and for the other major industry groups.

In accordance with the practice followed throughout the investigation, consolidated income statements of the obligor and its subsidiaries were used rather than those covering the obligor and its parent, on the assumption that such statements best reflect the true earning power behind the obligation.[6] *Pro forma* statements were not used, and ICC statements were used only when company statements were not available.   ◌

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[5] Cf. Walker D. Hines, *War History of American Railroads* (New Haven, 1928), pp. 94 f.

[6] Our practice in this respect closely follows the present provisions of Section 81 of the Insurance Law of New York defining legal investments of life insurance companies.

Times-Charges-Earned Ratios and
Margins of Safety at Offering

Percentage distributions of the par-amount totals of bonds offered in quadrennial periods, 1900–1943, by the times-charges-earned ratio and ratio of net income to gross income, are presented in Tables 81 and 82. Because of the sparsity of financial data on earnings coverage in the early part of the century and the stringent conditions under which the ratios were computed, the coverage of the tables is more fragmentary than that of others presented in this report, and the data would be especially difficult to interpret unless adjusted to exclude issues for which no information was available. For that reason we have departed from our usual practice of presenting the original unadjusted figures (with a special category for the information-lacking items) and have based the tables on only those offerings for which the earnings ratios were computed. Coverage is indicated by the two right-hand columns of the tables, which give the par amounts included in the preceding columns and show their percentage ratio to total offerings. The adjusted distributions may, of course, be multiplied through by the indicated coverage to obtain the original distributions.

A pronounced improvement in coverage between 1900 and 1943 is evident, reflecting the larger volume of reliable financial information available for the latter part of the period. Thus the times-charges-earned ratio could be computed for only 11 percent of the par amount of bonds offered in the first of the quadrennial periods (1900–1903), as compared with 90 percent in the last period (1940–43). The coverage of the distributions of offerings by net income as a percentage of gross income was approximately the same as for times-charges-earned and exhibits the same secular improvement.

In the early part of the century the coverage was considerably better for railroads than for the other two major industry groups. In fact, beginning in 1908 the rail coverage was always better than 60 percent, except for the three quadrennial periods affected by federal operation (1916–19, 1920–23, and 1924–27). It will be observed that the coverage improved markedly for utilities and industrials in later years, so that from 1932 onward the utilities had a better coverage than the rails, and the industrials were not far behind.

TABLE 81—Percentage Distributions of Offerings by Times-Charges-Earned Ratio at Offering, and Average Ratios, Four-year Periods 1900–1943

PERIOD OF OFFERING	DISTRIBUTION BY TIMES-CHARGES-EARNED RATIO					Average Times Charges Were Earned	COVERAGE	
	Under 1.0	1.0–1.4	1.5–1.9	2.0–2.9	3.0 and over		Par Amount (millions)	Percent of Total Offerings
All Issues								
1900–1903	31.3%	31.6%	26.1%	9.6%	1.4%	1.3	$ 445.4	10.8%
1904–1907	26.8	36.6	15.8	17.3	3.5	1.4	1,217.7	27.1
1908–1911	14.2	31.8	21.7	19.1	13.2	1.8	1,838.6	38.2
1912–1915	14.9	25.0	34.8	17.6	7.7	1.8	2,227.3	45.1
1916–1919	7.3	39.2	23.2	16.5	13.8	2.0	1,365.0	30.0
1920–1923	18.9	36.6	17.5	13.5	13.5	1.8	2,619.0	33.1
1924–1927	14.8	28.4	20.5	15.5	20.8	2.0	4,396.5	39.9
1928–1931	9.4	19.0	28.4	24.2	19.0	2.1	5,617.4	56.4
1932–1935	12.2	14.5	11.1	29.7	32.5	2.6	3,121.7	74.1
1936–1939	7.6	13.8	13.7	27.0	37.9	2.8	8,094.3	86.1
1940–1943	3.6	7.0	9.5	29.7	50.2	3.3	5,490.7	89.6
Railroads								
1900–1903	25.9	34.9	28.6	10.6	0.0	1.3	403.7	20.2
1904–1907	25.6	38.5	16.8	18.4	0.7	1.3	1,121.6	49.7
1908–1911	14.5	33.9	25.4	20.1	6.1	1.6	1,527.5	69.1
1912–1915	19.8	24.8	36.6	16.9	1.9	1.5	1,513.5	69.1
1916–1919	21.3	60.6	9.4	8.7	0.0	1.2	183.3	12.4
1920–1923[a]	0.0	54.5	0.0	45.5	0.0	1.7	1.1	0.1
1924–1927	16.3	55.9	16.8	8.8	2.2	1.3	723.4	37.3
1928–1931	2.5	33.4	41.2	13.1	9.8	1.8	1,650.7	79.6
1932–1935	9.1	57.4	28.1	3.1	2.3	1.4	362.6	60.8
1936–1939	3.2	70.0	5.5	5.4	15.9	1.9	1,229.7	85.5
1940–1943	23.5	36.4	38.5	1.6	0.0	1.1	573.2	69.2

TABLE 81
(continued)

PERIOD OF OFFERING	DISTRIBUTION BY TIMES-CHARGES-EARNED RATIO					Average Times Charges Were Earned	COVERAGE	
	Under 1.0	1.0–1.4	1.5–1.9	2.0–2.9	3.0 and over		Par Amount (millions)	Percent of Total Offerings
					Public Utilities			
1900–1903	83.9%	0.0%	1.5%	0.0%	14.6%	1.2	$ 41.7	3.8%
1904–1907	49.1	16.9	4.4	3.7	25.9	2.0	81.6	5.5
1908–1911	20.1	33.7	4.5	14.4	27.3	2.1	198.3	11.4
1912–1915	5.2	30.4	36.0	18.7	9.7	1.9	600.1	31.1
1916–1919	6.9	48.3	26.3	12.1	6.4	1.6	876.0	43.3
1920–1923	21.0	48.4	19.8	6.0	4.8	1.4	1,774.6	56.6
1924–1927	15.6	32.5	27.9	17.3	6.7	1.6	2,381.9	43.1
1928–1931	12.8	15.6	27.0	28.9	15.7	2.0	3,194.2	59.1
1932–1935	0.6	9.8	12.2	39.5	37.9	3.0	2,012.9	82.3
1936–1939	0.3	3.6	20.0	36.8	39.3	3.0	4,594.0	88.7
1940–1943	0.5	4.4	6.4	42.1	46.6	3.1	3,358.7	97.3

TABLE 81
(concluded)

PERIOD OF OFFERING	DISTRIBUTION BY TIMES-CHARGES-EARNED RATIO					Average Times Charges Were Earned	COVERAGE	
	Under 1.0	1.0–1.4	1.5–1.9	2.0–2.9	3.0 and over		Par Amount (millions)	Percent of Total Offerings
Industrials								
1900–1903	0.0%	0.0%	0.0%	6.9%	93.1%	6.1	$ 0.0	0.0%
1904–1907[a]	0.0	0.0	1.3	13.3	85.4	3.5	14.5	1.9
1908–1911	0.0	0.0	5.3	21.6	73.1	4.7	112.8	13.0
1912–1915	0.0	0.1	22.9	33.9	43.1	3.6	113.7	13.8
1916–1919							305.7	28.9
1920–1923	14.5	11.5	12.8	29.3	31.9	2.8	843.3	26.5
1924–1927	12.6	5.2	9.0	15.9	57.3	3.1	1,291.2	36.5
1928–1931	10.1	2.4	6.3	28.9	52.3	3.1	772.5	31.1
1932–1935	45.0	6.1	0.0	16.4	32.5	2.4	746.2	63.6
1936–1939	24.8	3.9	5.5	18.9	46.9	3.0	2,270.6	81.6
1940–1943	2.8	1.9	5.4	13.3	76.6	4.4	1,558.8	84.3

Based on Table 79 of *Statistical Measures*: par-amount data for all large (straight) corporate issues with information available on times-charges-earned ratio, and for 10 percent of such small issues adjusted annually to universe totals. The ratio was not computed for guaranteed issues, issues of companies deriving their major income from rentals, or for railroads when the requisite earnings statements reflected years of federal operation (1918–20). Average annual income after taxes but before charges over the five-year period preceding offering date was related to the fixed charges for the first full year following offering.

[a] Based on less than five offerings.

As Table 81 indicates, fixed charges were usually earned a smaller number of times at offering by rails than by utilities, and by utilities than by industrials. On the average over the full period studied, rails earned their charges about one and one-half times at offering, utilities just over twice, and industrials over three and one-half times. The average ratios reflect in part the heavy indebtedness of the rails and utilities, and the comparatively light indebtedness of the industrials. The lower ratios for bonds offered by the two regulated industry groups also reflect the faith of investors at the time of offering in the cyclical stability of their earnings.

The strength of public utility bonds in the past arose from the fact that they were obligations of a rapidly growing industry, and that utility earnings fluctuated narrowly about a rising trend (in contrast with the rails, where neither of these conditions was met during most of the period studied). The utilities have also had unusually high ratios of net income to gross income (20 percent on the average at offering), which meant that they were able to carry a large proportion of their gross revenues through to net earnings (Table 82). An additional element of strength is that depreciation charges have usually been fairly heavy for the utilities. The two factors combined (heavy depreciation charges and a high ratio of net income to gross income) meant that the gross revenues of the utilities could decline by substantial amounts and still leave adequate cash throw-offs from operations to cover fixed charges. It is thus not surprising that the utilities had the best record with respect to defaults of any of the major industry groups, despite their heavy fixed charges. (For the annual default record of the major industries, see Chapter 2 of this report; also *Volume of Financing,* Table A–17.)

The records indicate that the rails and industrials stood about even when compared on the basis of ratios of net income to gross income at offering. Obligors in these two industries typically had only half as large margins of safety as the public utilities, so that many of them ran out of cash quickly during business contractions and defaulted on their obligations. On the other hand, since industrial fixed charges were light in relation to earnings, and industrial earnings recovered rapidly during business expansions, industrial defaults were usually remedied quickly. The rails, with heavier fixed charges and a slower rate of growth, were less fortunate in these respects, and many of their obligations remained

TABLE 82—Percentage Distributions of Offerings by Ratio of Net Income to Gross Income at Offering, and Average Ratios, Four-year Periods 1900–1943

PERIOD OF OFFERING	DISTRIBUTION BY RATIO OF NET INCOME TO GROSS INCOME						Average Ratio of Net to Gross	COVERAGE	
	Negative	Under 10 Percent	10–14 Percent	15–19 Percent	20–24 Percent	25 Percent and over		Par Amount (millions)	Percent of Total Offerings
All Issues									
1900–1903	5.4%	36.1%	22.7%	14.2%	13.2%	8.4%	13.0%	$ 533.2	13.0%
1904–1907	1.5	22.6	23.3	28.6	11.5	12.5	15.8	1,275.7	28.4
1908–1911	3.8	21.2	23.5	24.5	12.6	14.4	15.9	1,865.9	38.8
1912–1915	3.3	15.9	23.3	18.0	31.1	8.4	16.7	2,237.8	45.3
1916–1919	15.7	18.3	14.1	20.2	15.7	16.0	14.9	2,087.7	45.9
1920–1923	4.5	27.3	23.6	23.4	8.9	12.3	14.0	2,524.2	31.9
1924–1927	3.7	23.4	24.0	19.8	14.2	14.9	15.3	4,296.8	39.0
1928–1931	2.2	18.4	19.7	22.4	20.5	16.8	17.2	5,654.2	56.8
1932–1935	10.9	19.6	9.6	11.6	18.8	29.5	17.3	2,924.8	69.4
1936–1939	16.1	21.4	18.3	16.3	13.5	14.4	13.5	7,640.5	81.3
1940–1943	5.7	30.1	20.3	26.9	7.2	9.8	13.2	5,501.7	89.8
Railroads									
1900–1903	5.9	39.2	24.7	15.4	13.0	1.8	11.4	491.5	24.6
1904–1907	1.7	21.1	24.7	29.6	11.3	11.6	15.8	1,153.7	51.1
1908–1911	4.6	20.0	26.6	26.5	11.2	11.1	15.1	1,527.5	69.1
1912–1915	4.0	18.8	27.1	14.6	29.2	6.3	15.7	1,513.5	69.1
1916–1919	36.9	15.3	13.9	15.4	13.7	4.8	10.0	870.2	59.0
1920–1923a	0.0	54.5	45.5	0.0	0.0	0.0	7.3	1.1	0.1
1924–1927	11.7	63.8	9.9	13.0	0.4	1.2	6.8	723.4	37.3
1928–1931	1.9	41.3	40.2	7.8	3.6	5.2	11.6	1,680.1	81.0
1932–1935	8.5	70.4	20.1	1.0	0.0	0.0	7.1	362.6	60.8
1936–1939	62.9	17.3	0.1	4.3	4.9	10.5	5.1	1,232.7	85.7
1940–1943	37.4	45.5	15.4	0.0	0.0	1.7	4.3	573.2	69.2

TABLE 82
(continued)

| PERIOD OF OFFERING | DISTRIBUTION BY RATIO OF NET INCOME TO GROSS INCOME | | | | | | COVERAGE | | |
	Negative	Under 10 Percent	10–14 Percent	15–19 Percent	20–24 Percent	25 Percent and over	Average Ratio of Net to Gross	Par Amount (millions)	Percent of Total Offerings
					Public Utilities				
1900–1903	0.0%	0.0%	0.0%	0.0%	14.6%	85.4%	31.0%	$ 41.7	3.8%
1904–1907	0.0	43.1	6.0	9.9	16.2	24.8	15.7	102.5	6.9
1908–1911	0.5	7.5	11.3	21.1	25.6	34.0	22.0	248.9	14.4
1912–1915	1.9	8.7	12.4	25.5	37.2	14.3	19.4	636.0	33.0
1916–1919	0.6	13.7	14.0	26.7	19.7	25.3	19.4	1,056.2	52.3
1920–1923	5.7	17.3	24.0	29.0	11.0	13.0	15.4	1,822.5	58.1
1924–1927	0.5	5.9	26.0	28.5	21.0	18.1	18.5	2,494.8	45.1
1928–1931	0.0	1.2	9.0	32.1	31.9	25.8	21.6	3,342.4	61.8
1932–1935	0.4	5.7	9.8	16.5	26.3	41.3	23.0	2,033.5	83.2
1936–1939	0.7	5.7	25.8	25.8	21.0	21.0	19.2	4,626.1	89.3
1940–1943	1.6	7.7	21.3	43.7	10.1	15.6	17.4	3,358.7	97.3

TABLE 82
(concluded)

PERIOD OF OFFERING	DISTRIBUTION BY RATIO OF NET INCOME TO GROSS INCOME						Average Ratio of Net to Gross	COVERAGE	
	Negative	Under 10 Percent	10–14 Percent	15–19 Percent	20–24 Percent	25 Percent and over		Par Amount (millions)	Percent of Total Offerings
Industrials									
1900–1903	0.0%	0.0%	30.8%	69.2%	0.0%	0.0%		$ 0.0	0.0%
1904–1907a	0.0	80.6	3.8	0.0	0.2	15.4	16.0%	19.5	2.6
1908–1911	0.0	20.2	36.4	24.1	18.2	1.1	12.1	89.5	10.3
1912–1915	0.0	65.2	15.5	3.2	0.6	15.5	14.6	88.3	10.7
1916–1919	0.0	53.3	22.4	9.0	3.4	10.7	11.7	161.3	15.2
1920–1923	1.2	36.8	28.6	4.2	7.9	16.8	10.5	700.6	22.0
1924–1927	5.7	49.1	21.8	9.3	4.7	0.3	13.6	1,078.6	30.5
1928–1931	14.8	38.1	1.5	0.0	2.8	4.6	8.3	631.7	25.5
1932–1935	53.0	65.0	11.1	0.0	0.0	0.0	2.7	528.7	45.1
1936–1939	23.9	72.5	19.8	0.9	3.6	0.3	4.3	1,781.7	64.0
1940–1943	2.9						7.5	1,569.8	84.9

Based on Table 82 of *Statistical Measures*: par-amount data for all large (straight) corporate issues with information available on ratio of net income to gross income, and for 10 percent of such small issues adjusted to universe totals. The ratio was not computed for guaranteed issues, issues of companies deriving their major income from rentals, or for railroads when the requisite earnings statements reflected years of federal operation (1918–20). Net income (after charges and taxes) and gross income were averaged over the five-year period preceding offering date.

a Based on less than five offerings.

CHART 28—Times-Charges-Earned Ratio and Ratio of Net Income to Gross Income for Bond Offerings, 1900-1943

Times-charges-earned ratio

Ratio of net income to gross income

——— All issues   ━ ━ ━ Public utilities and industrials
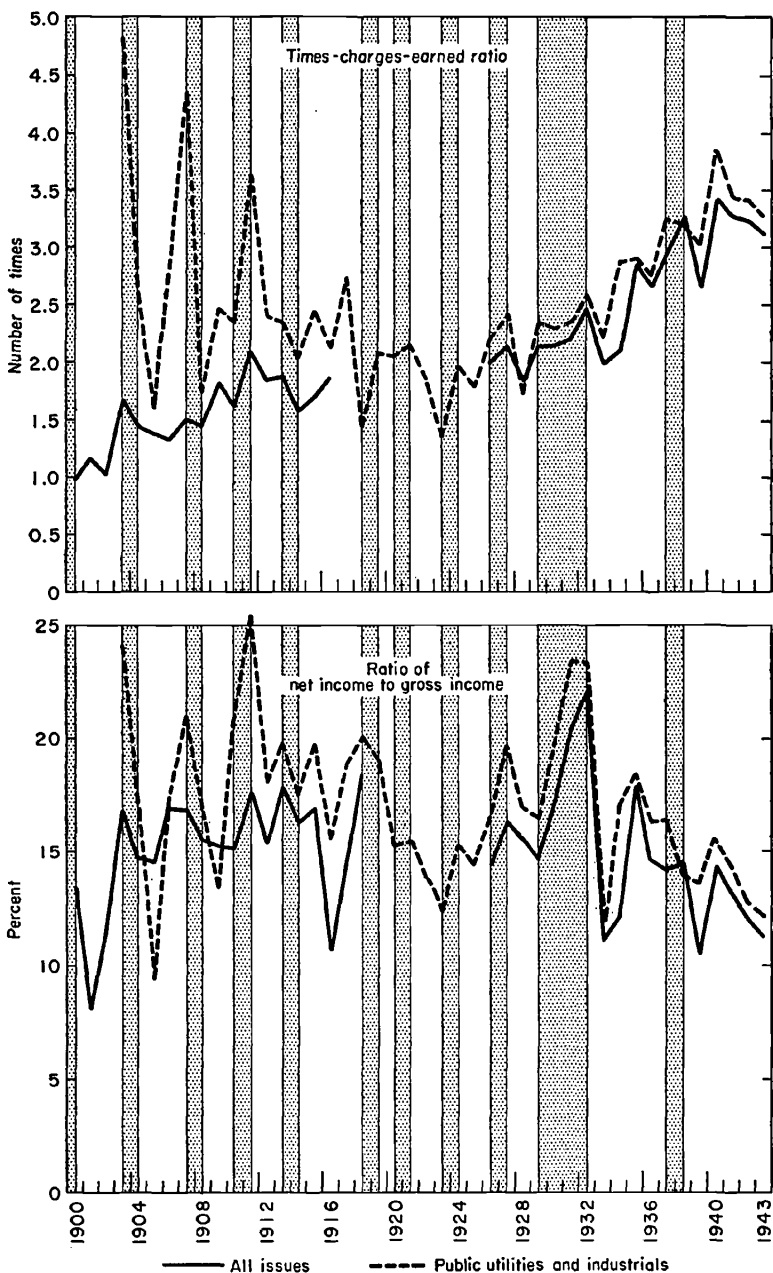
in default over extended periods. (On the speed of default settlements for major industry groups, see *Volume of Financing,* pp. 210–14.)

Tables 81 and 82 reveal several additional points of interest pertaining to the behavior of the financial ratios for offerings. One is that earnings coverage as measured by the times-charges-earned ratio rose rather consistently in the all-industries totals over the period studied, the average ratio rising from 1.3 in 1900–1903 to 3.3 in 1940–43. (This also appears clearly in Chart 28, which shows weighted averages of the ratios calculated annually for borrowing corporations.) Analysis of the data for the major industry groups shows that the upward trend was found only in the public utilities, the industrials fluctuating violently but neither rails nor industrials showing any apparent trend. The ratios were usually lower for rails than for the other industries, and the gradual decline in the importance of rails in total bond offerings and the improved coverage of the data for utilities and industrials combined to raise the fixed charge ratios for the all-industries totals.

A quirk of the data is that a comparable improvement does not appear in the ratios of net income to gross income at offering (Table 82, and the lower panel of Chart 28). Thus the average ratio for all industries combined was identical (13 percent) for the initial and terminal periods of Table 82, although sharp fluctuations occurred in the interim years. The margin of safety was fairly stable for public utilities over the full period 1900–1943, but drifted downward for industrials. It was definitely lower for the railroads after they were returned to private management at the end of World War I.

Notes to Chart 28.

Mean ratios weighted by par amounts, from Tables 79 and 82 of "Statistical Measures," covering all straight corporate issues for which information was available (see Tables 81 and 82 herein). In the times-charges-earned ratio, average annual income (after taxes but before charges) over the five-year period preceding offering date was related to the fixed charges for the first full year following offering. In the ratio of net income to gross income, both net and gross were averaged over the five years preceding offering date. Since ratios were not computed for railroad issues during the period of federal operation, the all-industries lines exclude 1917-25 for the times-charges-earned ratio and 1919-25 for the ratio of net income to gross income (see text section on nature of the data).

Shaded areas, representing contractions in general business activity, and white areas, representing expansions, are from Arthur F. Burns and Wesley C. Mitchell's "Measuring Business Cycles" (National Bureau of Economic Research, 1946), p. 78.

Earnings Ratios and Business Cycles

A further point of interest is the possible effect of the business cycle on the financial ratios near the date of offering. The quadrennial distributions of offerings are clearly inadequate for analyzing it, but so far as they go, seem to suggest rather low conformity to business cycles. No systematic relationship, for example, can be detected between changes over the quadrennial periods in the proportions of offerings with high or low financial ratios and changes over the corresponding periods in the indexes of business activity presented in Table 7. It is not entirely clear, a priori, whether or not a close correspondence should be expected between the financial ratios we have used and business cycles. For most corporations, and for the universe of all corporations, current earnings ratios improve in good times and deteriorate in bad; but our statistics cover only borrowing corporations, and their ratios need not follow that pattern if rigid standards of inherent investment quality are imposed by lenders on borrowers. Moreover, our ratios are not based on current earnings of business corporations but on past earnings. The numerator of the times-charges-earned ratio and both the numerator and the denominator of the ratio of net to gross income are averages of earnings over the five years preceding the year of offering. Tests indicate that for all corporations such ratios have a smaller amplitude of cyclical variation than corresponding ratios based on current earnings, and negligible conformity to business cycles.[7] Our earnings ratios may, as a matter of fact, be looked upon as measures of inherent quality, akin to agency ratings and legal status, and are frequently used precisely as such by professional investors when selecting corporate bonds at offering.[8] It is therefore of interest

[7] Ratios of net to gross income, but not the times-charges-earned ratios, can be computed from *Statistics of Income* data covering all reporting corporations. When based on current earnings, the ratios are highly correlated with business cycles (conformity indexes +60, +100, +80). Ratios of five-year moving averages of net to gross income, postdated one year after the latest year included, from *Statistics of Income*—which represent universe estimates corresponding to weighted averages of our ratios for borrowing corporations—show negligible conformity (conformity indexes —100, 0, —14; the high negative index for expansions reflects a downward trend of the ratio of net to gross income for the corporate universe over the period studied, and has no cyclical significance). It should be noted in passing that our ratios are not based on moving averages, but are weighted averages of past earnings for the particular corporations that happened to borrow in the respective years.

[8] As a matter of fact, they are so used in the laws governing investment

to observe how these measures behaved over business cycles; for it is at least conceivable that some investors may have raised or lowered the standards applied to borrowers, even though the intrinsic quality of the corporate universe may have undergone little cyclical change.

To explore this matter, special annual series were constructed showing the weighted average number of times that fixed charges were earned before offering (with par amounts of offerings as weights) and the corresponding averages based on net income as a percent of gross income. Since information on the major industry groups was sketchy for certain of the early years, the utilities and industrials have been combined in Chart 28 (after appropriate par-amount weighting). Since little information was available for the rails for years in which they were affected by federal operation, they have been omitted from the chart, as well as from the all-industries figures for that period. When constructing conformity indexes for these series, business cycles for which little or no information was available were ignored (see note to Table 83).

The graph of the times-charges-earned ratios for borrowing corporations indicates a rather low, but nevertheless perceptible, inverse conformity to business cycles, a fact that is substantiated by the generally negative signs of the conformity indexes in Table 83. Unfortunately, comparable data are not available for nonborrowing corporations (nor for the universe of all corporations), so that not too much emphasis should be placed on these results. The inverted patterns of conformity are not pronounced and only the full-cycle index for industrials is so high as to indicate significant inverse conformity. (The positive expansion index for all industries reflects the upward drift of the times-charges-earned ratio in our sample and has no cyclical significance.) Moreover, an analysis of the timing of the turning points of the individual series relative to those of the general business cycle failed to reveal a systematic pattern of leads or lags for the rails and utilities. Industrials were found to be coincident with the business cycle, the series typically falling from business trough to peak and rising from peak to trough. We conclude that some slight evidence of a perverse credit cycle may be detected in the times-charges-earned ratios of industrial borrowers, with a tendency for

eligibility for various financial institutions; see the opening paragraph under "Earnings Coverage," above.

investors to accept offerings with lower average earnings coverage
as business expanded, and to require higher average coverage as
business contracted.

TABLE 83—Conformity Indexes for Times-Charges-Earned
    Ratio and Ratio of Net Income to Gross Income for
    Bonds Offered 1900–1943

	Expansion	*Contraction*	*Full Cycle*
	Times-Charges-Earned Ratio		
All industries	+62	−14	−8
Public utilities and			
industrials	0	−20	−26
Railroads	−25	−14	−8
Public utilities	−20	−20	−16
Industrials	−25	−25	−60
	Ratio of Net Income to Gross Income		
All industries	0	−14	−8
Public utilities and			
industrials	0	0	−26
Railroads	0	+14	+8
Public utilities	−30	0	−26
Industrials	−25	−25	−33

Based on average ratios of the annual par-amount data for straight corporate
bonds in *Statistical Measures*, Tables 79 and 82; these indexes do not take
account of possible leads or lags at reference-cycle turning points. Since
ratios were not computed for railroad issues when the requisite earnings
statements reflected years of federal operation (1918–20), the indexes for
railroads and for all industries cover seven complete and one partial expansion
(for times-charges-earned, only six complete and two partial expansions)
and seven contractions. Information was available on less than five issues for
utilities before 1905 and for industrials before 1910. The indexes for utilities
and for the combination of utilities and industrials are therefore based on
nine complete and one partial expansion and on ten contractions, and the
indexes for industrials on seven complete and one partial expansion and on
eight contractions.

The conformity indexes for the ratios of net income to gross
income preceding offering indicate erratic conformity to business
cycles, but the chart suggests a more systematic pattern. The ex-
planation is that the conformity indexes of the table were con-
structed on the assumption of coincident timing with business
cycles. Analysis of the timing of the turning points of these series
reveals that the ratio of net income to gross income for each indus-
try group except railroads typically expanded from mid-expansion

of the general business cycle (stage III) through the following trough (stage IX), and contracted during early business expansions (stages I–III). The conformity indexes on the revised basis are: for all industries, —75 for expansions, —43 for contractions, and —85 for the full cycle; for public utilities and industrials combined, —80, —20, and —68; for public utilities alone, —60, —20, and —47; and for industrials alone, —50, —25, and —47. It is significant that the corresponding ratios for all reporting business corporations, calculated from data in *Statistics of Income,* show negligible conformity to business cycles on the same timing basis.[9]

Since business contractions in the United States have usually been short-lived, annual data do not permit accurate determination of the timing of turning points during contraction phases of the cycle. We can, however, feel more confident about the behavior of the annual series during expansion phases. The ratios of net income to gross income typically reached troughs and began to rise in advance of the upper turning point of business generally. It is well known that common stock prices have usually turned downward before general business, indicating greater caution on the part of investors toward the close of expansion phases of the cycle. The evidence suggests that this may have been true of bond investors as well, since the margin of safety required on new flotations turned upward before business generally began to slide.

The two earnings ratios thus provide some indication of the existence of a perverse credit cycle in corporate bond financing, a finding that supports the conclusions of earlier chapters. Generally speaking, lower investment standards appear to have prevailed in good times than in bad. Whether this was caused by the same investors varying their standards or by different investors entering or leaving the market in expansions and contractions, the effect was to make it more difficult for marginal borrowers to obtain funds through the corporate bond market when business was contracting than when it was beginning to expand. It is remarkable that despite this finding, the total volume of funds flowing through the corporate bond market from lenders to borrowers exhibits an inverted pattern (cf. Chapter 4 of *Volume of Financing*). That is to say, more funds were obtained through the bond market during business contractions than during expan-

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[9] See footnote 7 for the conformity indexes constructed on the bases of coincident timing. On a I–III basis the indexes are —100 for expansions, 0 for contractions, and —43 for the full cycle.

sions, despite the fact that investors may have raised their standards in contraction phases of the cycle and lowered them during early business expansions. Perhaps, better-than-average risks entered the bond market in business contractions and turned to the stock market or other sources for funds during business expansions, a conjecture consistent with a hypothesis advanced in the first report of this series concerning cyclical shifts in the demand for capital funds (*Volume of Financing,* Chapter 4).

Default Rates

The theory behind the use of financial ratios by investors who purchase at offering is that the ratios provide an index to the risk of future default. After suitable allowance is made for the stability of earnings and the growth prospects of particular borrowers, the larger the number of times fixed charges are earned before offering, and the higher the ratio of net income to gross income, the greater is the protection afforded by earnings, and the lower should be the subsequent rate of default.

Evidence on this matter is presented in Tables 84 and 85, which show the proportions of the par-amount totals of bond offerings that subsequently went into default, classified by the two earnings ratios at offering. A glance at the tables indicates that the ratios stand up well under empirical testing. For all large and for all small issues, the proportions of the par-amount totals of offerings subsequently going into default were systematically lower the higher the ratio of earnings to fixed charges; and the same was true of the major industry components, except for street railways and industrials. The default rates do not appear to be quite so systematically related to the ratio of net income to gross income at offering (note particularly the utilities and industrials), but for all issues combined, they, too, decline as the ratio improves. The relatively poor results for industrials may be due to the greater heterogeneity of that group than of rails and utilities, or perhaps to the greater volatility of industrial earnings.

The default rates were influenced as much by the industry of the obligor as by the financial ratios at offering. For example, the record for the large issues (*Statistical Measures,* Table 195) indicates that a times-charges-earned ratio of 1.5, if set by a hypothetical investor as the limit below which he would not go when purchasing bonds at offering, would have excluded 71 percent of the par-amount total of the rail defaults and 97 percent of the utility

TABLE 84—Proportions of Offerings 1900–1943 in Given Classes of Times-Charges-Earned Ratio at Offering That Went into Default before 1944

| | All Regular Offerings | TIMES-CHARGES-EARNED RATIO | | | | | |
		Under 1.0	1.0–1.4	1.5–1.9	2.0–2.9	3.0 and over	Information Lacking or Not Computed
Large issues, all							
industries	17.3%	35.0%	34.1%	17.9%	4.0%	2.1%	19.7%
Railroads	28.1	55.2	49.9	28.0	15.1	5.5	18.7
Public utilities	10.6	41.8	11.5	9.3	0.1	0.2	18.2
Street railways	64.3	65.6	49.0	84.8	5.9	38.6	66.0
All others	6.3	38.4	4.1	0.4	0.0	0.0	12.7
Industrials	14.8	9.7	16.0	16.5	7.4	4.0	23.2
Small issues, all							
industries	24.9	29.0	15.6	6.2	4.2	0.0	30.2
Railroads	20.6	43.0ᵃ	13.2	0.0	0.0	0.0ᵃ	26.2
Public utilities	20.9	28.4	12.4	5.8	0.0	0.0	26.8
Street railways	67.1	96.6ᵃ	84.9	100.0ᵃ			62.3
All others	13.2	17.6	5.0	0.7	0.0	0.0	18.7
Industrials	33.7	0.0ᵃ	100.0ᵃ	100.0ᵃ	18.3		35.9

Based on par-amount data for regular offerings in the offerings experience sample, *Statistical Measures*, Tables 194 and 195, and special supplementary tabulations. The ratio was not computed for guaranteed issues, issues of companies deriving their major income from rentals, or for railroads when the requisite earnings statements reflected years of federal operation (1918–20). Average annual income after taxes but before charges over the five-year period preceding offering date was related to the fixed charges for the first full year following offering.

ᵃ Based on less than five offerings.

TABLE 85—Proportions of Offerings 1900–1943 in Given Classes of Ratio of Net Income to Gross Income at Offering That Went into Default before 1944

	All Regular Offerings	RATIO OF NET INCOME TO GROSS INCOME						
		Negative	Under 10 Percent	10–14 Percent	15–19 Percent	20–24 Percent	25 Percent and over	Information Lacking or Not Computed
Large issues, all industries	17.3%	17.2%	27.5%	17.6%	12.7%	11.6%	3.3%	19.1%
Railroads	28.1	27.6	50.5	30.8	28.6	27.7	6.7	18.2
Public utilities	10.6	1.0	12.6	9.2	7.5	7.3	1.4	18.8
Street railways	64.3	2.0	34.2	73.0	74.5	74.5	72.9	67.4
All others	6.3	0.0	2.8	2.9	4.4	4.6	0.1	13.2
Industrials	14.8	9.6	4.1	11.2	4.6	12.1	20.5	20.4
Small issues, all industries	24.9	30.8	22.8	6.1	14.2	1.3	0.0	30.4
Railroads	20.6	50.0a	10.2	12.6	10.0	9.8a	0.0	25.2
Public utilities	20.9	0.0a	36.2	2.8	10.8	0.0	0.0	27.7
Street railways	67.1	0.0a	91.3		100.0a			62.3
All others	13.2		14.1	2.8	6.6	0.0	0.0	19.5
Industrials	33.7	0.0a	20.4	0.0a	100.0a		0.0a	35.4

Based on par-amount data for regular offerings in the offerings experience sample, *Statistical Measures*, Tables 197 and 198, and special supplementary tabulations. The ratio was not computed for guaranteed issues, issues of companies deriving their major income from rentals, or for railroads when the requisite earnings statements reflected years of federal operation (1918–20). Net income (after charges and taxes) and gross income were averaged over the five-year period preceding offering date.

a Based on less than five offerings.

defaults (excluding street railways), but only 32 percent of industrial defaults. Similarly, a ratio of twice fixed charges or better at offering would have excluded 94 percent of rail defaults and 99.7 percent of utility defaults, but only 49 percent of industrial defaults.

It is thus clear that to have attained an equal degree of exposure to default risk within each industry group for the large issues, it would have been necessary to set higher standards for rails than for utilities, and still higher standards for industrials. Because of the tremendous growth potential of the utility industry (exclusive of street railways), only 0.7 percent of the par-amount total of the offerings of that group with fixed charges earned at least once went into default during the period studied (4.1 percent in terms of number of issues). To obtain similarly low default rates in other industry groups, it would have been necessary for the investor to restrict purchases to rail issues on which charges were earned approximately three times preceding offering, and to industrial issues on which charges were earned approximately four times. It should be noted that in one edition of their text Benjamin Graham and David L. Dodd suggest a minimum coverage of one and three-quarter times fixed charges for utilities, two times fixed charges for railroads, and three times fixed charges for industrials.[10] In our records the times-charges-earned ratios are classified by intervals of one-half percent. The ratios indicate that the default rate on large utilities (including street railways) earning charges one and one-half times or more at offering was 2.5 percent in terms of par amount and 6 percent in terms of number of issues. Similar default rates occurred for rails earning charges at least two and one-half to three times, and for industrials earning charges at least three to four times.

The relationship between earnings ratios preceding offering and default experience afterward may be examined in greater detail by means of the cross-classifications of default rates presented in Table 86. To facilitate statistical testing, the default rates of this table are based on the number of offerings rather than on the par amounts. Because of the sparsity of data for small issues, only large issues are included.

[10] *Security Analysis,* 1940 edition, p. 128. The minimum coverages given by Graham and Dodd are presumably after-tax ratios comparable to those used in this report. In a later edition of their text they recommend much higher pretax ratios.

TABLE 86—Proportions of Number of Offerings 1900–1943 in Given Times-Charges-Earned Ratio and Ratio of Net Income to Gross Income Classes at Offering That Went into Default before 1944, with Number of Offerings in Each Class

Times-Charges-Earned Ratio	RATIO OF NET INCOME TO GROSS INCOME					
	Under 4 Percent	4–9.9 Percent	10–14.9 Percent	15–19.9 Percent	20 Percent and over	Total
	Default Rates					
	Large Issues, All Industries					
Under 1.0	50.0%	46.7%	32.9%	32.7%	37.0%	42.9%
1.0–1.4	27.6	38.6	35.9	23.4	14.6	29.9
1.5–1.9	12.5	21.4	21.9	19.8	17.2	19.7
2.0–2.9	7.1	4.8	10.6	5.5	7.3	7.1
3.0 and over	0.0	6.1	6.8	1.3	2.3	3.4
TOTAL	37.1	30.7	25.3	16.2	11.0	21.4
	Large, Railroads					
Under 1.0	68.8	51.4	65.4	66.7	71.4	62.7
1.0–1.4	35.7	41.1	46.9	75.6	62.5	45.8
1.5–1.9	0.0	35.1	32.5	25.3	38.0	31.3
2.0–2.9	0.0	0.0	25.0	17.0	25.8	21.7
3.0 and over			0.0	0.0	2.9	2.1
TOTAL	55.2	42.4	42.0	32.8	30.1	40.8
	Large, Public Utilities					
Under 1.0	14.8	37.1	18.6	30.6	28.9	26.0
1.0–1.4	17.4	31.8	26.0	7.5	8.2	16.4
1.5–1.9	0.0	6.7	15.1	15.3	10.4	13.0
2.0–2.9		0.0	0.0	0.0	1.8	1.0
3.0 and over		33.3	12.5	0.0	0.0	1.6
TOTAL	15.4	28.8	17.2	9.5	5.9	11.2
	Large, Industrials					
Under 1.0	21.1				100.0	23.1
1.0–1.4	0.0	33.3	100.0	0.0	100.0	16.7
1.5–1.9	20.0	5.6	0.0	100.0		10.7
2.0–2.9	7.7	6.1	30.8	0.0	0.0	10.8
3.0 and over	0.0	5.1	4.2	7.1	21.1	6.2
TOTAL	11.8	6.0	10.6	9.5	27.3	10.1

TABLE 86
(concluded)

Times-Charges-Earned Ratio	RATIO OF NET INCOME TO GROSS INCOME					
	Under 4 Percent	4–9.9 Percent	10–14.9 Percent	15–19.9 Percent	20 Percent and over	Total
	Number of Offerings, Defaults and Nondefaults					
	Large Issues, All Industries					
Under 1.0	174	107	85	52	46	464
1.0–1.4	105	259	245	175	151	935
1.5–1.9	8	70	187	212	204	681
2.0–2.9	14	42	85	163	289	593
3.0 and over	17	82	74	77	218	468
TOTAL	318	560	676	679	908	3,141
	Large, Railroads					
Under 1.0	109	72	26	3	7	217
1.0–1.4	70	190	113	41	16	430
1.5–1.9	1	37	77	87	50	252
2.0–2.9	1	3	20	53	66	143
3.0 and over	0	0	2	11	34	47
TOTAL	181	302	238	195	173	1,089
	Large, Public Utilities					
Under 1.0	27	35	59	49	38	208
1.0–1.4	23	66	131	133	134	487
1.5–1.9	2	15	106	124	154	401
2.0–2.9	0	6	52	105	222	385
3.0 and over	0	3	24	52	165	244
TOTAL	52	125	372	463	713	1,725
	Large, Industrials					
Under 1.0	38	0	0	0	1	39
1.0–1.4	12	3	1	1	1	18
1.5–1.9	5	18	4	1	0	28
2.0–2.9	13	33	13	5	1	65
3.0 and over	17	79	48	14	19	177
TOTAL	85	133	66	21	22	327

Default rates are from special tabulations of the National Bureau of Economic Research, and are based on offerings of all large (straight) corporate issues as given in the second section of the table. For definition of times-charges-earned ratio, see note to Table 81; of ratio of net income to gross income, note to Table 82.

Examination of the default rates in the marginal rows and columns of the table reveals the close inverse relationship between each of the two earnings ratios and relative frequency of default. For example, in the all-industries section of the table, the default rate falls steadily from 42.9 percent for offerings on which fixed charges were earned less than once to 3.4 percent for those on which charges were earned three or more times. Similarly, the default rate falls from 37.1 percent for offerings on which net income was less than 4 percent of gross income to 11.0 percent for those on which net income was 20 percent or more. It will be observed that the inverse relationship is not quite so pronounced or so regular for public utilities as for all industries combined, especially in the net to gross ratio. For the heterogeneous and less numerous industrial group, the relationship of the margin of safety to the default rates was irregular and there is some evidence that it may even have been perverse, at least in certain class intervals.

Comparing default rates within columns (i.e. within given net-to-gross income classes) reveals that there was a perceptible tendency in each case for the default rate to fall as the times-charges-earned ratio rose, indicating that the improvement in performance was not simply the result of the joint, or correlated, effect of the two earnings ratios.[11] Similarly, across given rows of the table, the default rates tend to fall as the margin of safety improves, but the associations are not so close as the corresponding ones based on the times-charges-earned ratio at offering. The tendency for one ratio to compensate for the other (i.e. to offset the effect of holding the other ratio constant) was apparently greater when the given, or fixed, ratio was low than when it was high. For example, where charges were earned less than one and one-half times in the five years before offering, the default rate fell from 41 percent to 28 percent as the margin of safety rose from under 10 percent to 10 percent and over. On the other hand, where fixed charges were earned one and one-half times or more, the default rates were 10 percent and 11 percent, respectively, for the two margin-of-safety classes. Similarly, if the margin of safety was under 10 percent in the five years before offering, the default rate was 41 percent where fixed charges were earned less than one and

[11] Chi-square tests based on the total number of offerings, and on both defaults and nondefaults considered separately, indicate that the two earnings ratios were positively correlated at offering.

one-half times, but dropped to 10 percent where charges were earned one and one-half times or more. If the margin of safety exceeded 10 percent, the default rate also declined (from 28 percent to 11 percent for the two times-charges-earned classes), but the decline was not so great as when the margin of safety was lower.

To test whether these relationships were statistically significant, "contingency" tables were constructed containing in each cell the actual number of defaults and the "expected" number under various alternative assumptions as to the bearing of earnings coverage on default incidence. For example, it was assumed that the underlying default rate for the population from which observations were drawn was the same throughout all cells of each section of the table (21.4 percent for all industries, 40.8 percent for rails, and so on). The tests revealed that hypothesis to be clearly untenable for the two ratios considered jointly, from which we infer that the ratios, when used together, were reliable indicators of the subsequent rate of default. Other tests based on the same hypothesis revealed that each ratio when considered separately had a significant effect on subsequent default experience. That is to say, the higher the ratio, in either case, the lower was the default rate, so that each of the ratios was a useful indicator of subsequent default experience without regard to the level of the other. Highly significant results were obtained in all cases except for the industrial margin of safety. For industrial offerings, the margin of safety was not significantly related to subsequent experience, possibly because of the heterogeneity of the group and the small number of observations.

To determine whether one ratio compensated for the other (i.e. reduced default risk at a given level of the other ratio), a second set of tests was applied, first by assuming uniform default rates within given times-charges-earned classes (estimated by using the default rates from the marginal row totals of Table 86), and then by assuming uniform default rates within given margin-of-safety classes (those indicated by the column totals of Table 86). Highly significant results were obtained when the times-charges-earned ratio was applied to offerings within fixed margin-of-safety classes (industrials were an exception when the margin of safety was very low), but less systematic results were obtained for the margin of safety applied within given times-charges-earned classes. When the fixed charge coverage was moderately low

(times-charges-earned ratios of 1.0 and under 1.5), the margin of safety had a significant inverse effect on the default rate (except for the industrial group, where the data were inadequate); but when fixed charges were earned a greater number of times, the margin of safety had little or no independent effect (except for utilities). Also, for very weak offerings—those of obligors whose fixed charges were not covered once at offering—the margin of safety had no significant independent effect.[12]

On the whole, the results of these tests indicate that the two earnings ratios were useful predictors of default experience, whether used jointly or separately. The times-charges-earned ratio was also a useful predictor independently of the level of the mar-

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[12] As outlined above, standard chi-square tests based on the observed number of defaults were applied to the all-industries data and to each of the major industry groups. The class intervals used were similar to those shown in Table 86, but rearrangement was necessary in certain cases (particularly for the industrials) to obtain a sufficient number of "expected" observations in the cells.

The tests were of two basic types: (1) those in which a uniform default rate was assumed for all cells of the table, and (2) those in which a uniform default rate was assumed throughout a given row or column. Symbolically, let p_{ij} represent the probability of a default occurring in a cell located at the intersection of the ith row and jth column of the table; $p_{i.}$ the probability of a default occurring in the ith row; $p_{.j}$ the probability of a default in the jth column; and p the over-all probability of a default (row and column unspecified). Under the first set of tests, the following nul hypotheses were tested: $p_{i.} = p;\ p_{.j} = p;\ p_{ij} = p(i = 1, 2, \ldots, r;\ j = 1, 2, \ldots, s)$. That is, the tests were applied to the row totals, to the column totals, and to the entire contingency table, on the assumption of a uniform probability of default throughout the table. Since p was estimated from the data, only one degree of freedom was lost under each test. The results were significant ($P < 0.05$) in all cases except for the industrial ratio of net income to gross income ($0.10 < P < 0.20$) and were highly significant ($P < 0.01$) in all cases other than for industrials.

Under the second set of tests the nul hypotheses were as follows: $p_{ij} = p_{i.}$; $p_{ij} = p_{.j}$ ($i = 1, 2, \ldots, r;\ j = 1, 2, \ldots, s$), the test being applied to each of the r rows, to each of the s columns, to the combination of the r rows, and to the combination of the s columns. Since the $p_{i.}$ and $p_{.j}$ were estimated from the marginal totals, one degree of freedom was lost for each row (column). Since chi-square is additive, for the combined test for rows there were $(s - 1) \times r$ degrees of freedom; similarly, for the combined test for columns there were $(r - 1) \times s$ degrees of freedom. For the times-charges-earned ratio (with margin of safety held constant), the results were highly significant in all cases ($P < 0.01$) except for industrials, which were borderline cases ($0.01 < P < 0.06$). For the margin of safety, the results were not significant for industrials; nor for rails, utilities, and all industries with fixed charges earned less than once; nor for all industries and rails with fixed charges earned one and one-half times or more; but they were highly significant in the remaining cases.

gin of safety (i.e. within each margin-of-safety class), but the margin of safety was a useful independent predictor only for offerings in the moderately low times-charges-earned class. The fact that the default experience of corporate bonds was so closely related to the two earnings ratios at offering, both for all industries combined and for the major industry groups, appears remarkable in view of the length of time that normally intervenes between the date of offering and date of extinguishment and the large number of events that may occur in that interval to influence the ability of obligors to meet the fixed charges on their obligations.

Default Losses

The times-charges-earned ratio and the ratio of net income to gross income are useful at offering in estimating the degree of exposure to default risk, but we should not expect them to be too closely related to the price and yield experience of bond issues once they have gone into default. The evidence on this matter is presented in Tables 87 and 88. As in other experience tables for defaulted issues, the data are simple unweighted averages of prices and yields. Since little information was available for the small issues, they have been omitted from the tables.

Table 87, which contains prices at date of default, values of future receipts discounted back to date of default at 3 percent and at 6 percent, and yields realized from date of default to extinguishment, each classified by the two earnings ratios at offering, suggests that earnings coverage at offering had little influence on bond prices at default. (Note, however, the comparatively high prices where charges were earned three or more times before offering, and where net income was 25 percent or more of gross.) Since the investment process is essentially a forward-looking one, there was a slightly closer relationship between bond prices at default and values of future receipts discounted back to date of default at 3 and at 6 percent, but except in one instance (issues with net incomes of 20 to 24 percent of gross) the market was overly conservative at default, pricing most issues well below receipts discounted at 6 percent.

The upper section of Table 87 shows that payouts were highest on defaulted issues that had been in the highest times-charges-earned class preceding offering, so that the yields realized by investors who purchased such bonds at default and held them to extinguishment were exceptionally attractive. The reason is the

TABLE 87—Market Prices at Default, Discounted Values of Receipts after Default, and Realized Yields after Default for Bonds Classified by Times-Charges-Earned Ratio and by Ratio of Net Income to Gross Income at Offering, 1900–1943

EARNINGS RATIOS	*Number of Issues Used for Prices and Receipts*	*Average Price at Default*	RECEIPTS DISCOUNTED AT		*Realized Yield, Default to Extinguishment*
			3 Percent	*6 Percent*	
		Times-Charges-Earned Ratio			
Under 1.0	62	49	66	58	17.9%
1.0–1.4	93	39	60	49	19.6
1.5–1.9	41	48	66	56	23.1
2.0–2.9	15	40	54	47	20.6
3.0 and over	12	51	88	80	40.8
Information lacking or not computed	358	42	63	53	19.4
		Ratio of Net Income to Gross Income			
Negative	30	48	64	57	23.7
Under 10 percent	101	42	66	55	22.4
10–14 percent	51	47	70	59	19.5
15–19 percent	26	45	67	56	13.6
20–24 percent	16	45	51	44	14.2
25 percent and over	7	56	66	59	15.2
Information lacking or not computed	350	41	62	52	19.9

Sample data for large straight issues from special tabulations of the National Bureau of Economic Research. Receipts include liquidating values of securities still outstanding on January 1, 1944 at prices prevailing in the first quarter of that year. Prices, discounted values, and yields are unweighted averages. Neither of the earnings ratios was computed for guaranteed issues, issues of companies deriving their major income from rentals, or for railroads when the requisite earnings statements reflected years of federal operation (1918–20). In both ratios income is averaged over five years preceding offering date. In the computation of the times-charges-earned ratio, income after taxes but before charges is related to fixed charges for the first full year following offering. In the computation of the ratio of net income to gross income, net income is after charges and taxes.

large proportion of industrial issues in the group (75 percent) and the generally favorable experience record of large industrials from default to extinguishment (Table 20). Industrials were more evenly distributed among the margin-of-safety classes (lower section of Table 87) and the all-industry yields realized from default to extinguishment reacted in the opposite direction. Relative to

the discounted value of future payouts, market prices at default were particularly low for issues with a low average margin of safety near the date of offering, so that under this rating system the yields realized by investors who purchased at default were higher for the lower-grade issues. The same was found true of issues with a low composite agency rating one year and five years before default (Table 37). Except for industry differences, there-

TABLE 88—Yields and Loss Rates up to Default and over Life Span of Issues Defaulting 1900–1943 Classified by Times-Charges-Earned Ratio and by Ratio of Net Income to Gross Income at Offering

EARNINGS RATIOS	*Number of Issues*	*Promised Yield at Offering*	FIRST OFFERING TO DEFAULT		FIRST OFFERING TO EXTINGUISHMENT	
			Realized Yield	*Loss Rate*	*Realized Yield*	*Loss Rate*
Times-Charges-Earned Ratio						
Under 1.0	59	7.0%	−0.4%	7.4%	3.8%	3.2%
1.0–1.4	89	7.5	−2.8	10.3	2.8	4.7
1.5–1.9	39	4.8	−0.1	4.9	2.7	2.1
2.0–2.9	14	5.6	−0.9	6.5	1.5	4.1
3.0 and over	11	5.7	−6.2	11.9	3.5	2.2
Information lacking or not computed	337	6.2	−4.6	10.8	1.8	4.4
Ratio of Net Income to Gross Income						
Negative	28	9.7	2.3	7.4	7.2	2.5
Under 10 percent	96	5.7	−3.5	9.2	2.3	3.4
10–14 percent	49	8.7	2.1	6.6	4.2	4.5
15–19 percent	25	5.0	−2.5	7.5	2.2	2.8
20–24 percent	16	5.1	−0.9	6.0	1.4	3.7
25 percent and over	6	5.6	−2.2	7.8	0.8	4.8
Information lacking or not computed	329	6.1	−5.0	11.1	1.6	4.5

Sample data for large straight issues from special tabulations of the National Bureau of Economic Research. Yields and loss rates are unweighted averages. For issues still outstanding on January 1, 1944 liquidation is assumed at prices prevailing in the first quarter of that year. Neither of the earnings ratios was computed for guaranteed issues, issues of companies deriving their major income from rentals, or for railroads when requisite earnings statements reflected years of federal operation (1918–20). In both ratios income is averaged over the five years preceding offering data. In the computation of the times-charges-earned ratio, income after taxes but before charges is related to fixed charges for the first full year following offering. In the computation of the ratio of net income to gross income, net income is after charges and taxes.

fore, it would appear that under most rating systems low-grade issues had a more favorable experience record from default to extinguishment than high-grade issues.

Table 88, which contains promised yields of defaulted bonds at offering and yields realized from offering to default and to extinguishment, again classified by the two earnings ratios at offering, generally confirms the evidence of Table 87. The offering prices of issues with superior ratios of earnings to fixed charges were higher than those of other issues, and their promised yields were lower. Realized yields from offering to default show no systematic relationship to the number of times charges were earned, possibly because of industry differences. Thus, the times-charges-earned ratio, while a good predictor of the risk of default, was a poor one of the yield experience on bond offerings that went into default. As has been noted, the yields realized from default to extinguishment were highest for offerings in the best grade (largely because of the industrials), and these roughly offset the poor performance of the same issues from offering ·to default. Except for that one group, in which industrials predominate, the life-span yields on defaulted bonds (those covering the period from offering to extinguishment) were better for issues with the lower times-charges-earned ratios at offering.

Similar patterns appear for defaulted issues classified by ratio of net income to gross income. Yields promised at offering were generally lower for the better issues, but the yields realized from offering to default were irregular. Since in this case the realized yields from default to extinguishment were systematically higher the poorer the grade, the life-span yields of the weaker offerings were higher. In fact, the life-span yields of issues classified by the margin of safety near the date of offering were roughly proportional to the yields promised at offering, so that the loss rates from offering to extinguishment were virtually independent of the margin of safety. The comparable loss rates for the times-charges-earned ratios were erratic, but were lower for the highest grade issues.

Average Life-span Yields and Loss Rates
(nondefaulted and defaulted issues combined)

Life-span yields and loss rates for all issues (defaults and nondefaults) classified by the two ratios calculated from earnings data for the five years preceding offering are presented in Tables 89 and 90. The data in the tables are weighted averages, with par

amounts of offerings as weights, and cover all offerings in the large and small issues samples for which the earnings ratios could be computed (a relatively small proportion of the total, particularly for bonds offered in the early part of the century; see Tables 81 and 82).

Both tables exhibit the usual tendency for promised yields at offering to be inversely related to the quality of the issues. Exceptions to this rule are rare and can usually be explained by the mixing together of offerings of different industries and types in the averages, or by shifts in the level and structure of money rates over the period studied. The underlying averages of the promised yields for the major industries, presented in *Statistical Measures,* bear this out. They exhibit greater regularity than the all-industries figures, for offerings generally and for offerings of a given type in a given period, e.g. regular offerings since 1920.

A usual tendency also, we have found, is for realized yields from offering to extinguishment to behave like the promised yields, i.e. to be inversely related to the quality of bond issues at offering. With some irregularity the standard pattern appears again in Table 89 for total offerings of both large and small issues, but the opposite pattern appears for the large regular offerings classified by the times-charges-earned ratio. An examination of the underlying data for large regular offerings of the major industries indicates that the rails were the only nonconforming group (realized yields of utilities and industrials were inversely related to quality), but the pattern was so pronounced for the rails, and they bulked so large in the totals, that their behavior governs the all-industries averages. The structure of the realized yields for the rail group was influenced by the exceptionally high default rates on the large issues with low earnings coverage at offering (cf. Table 84), and by the low yields generally realized on defaulted issues (Table 13).

The story is about the same in Table 90, where the yields are classified by the ratio of net income to gross income at offering, except that in this case the realized yields for the regular offerings tend to revert to the standard pattern (lower yields for higher quality issues). The explanation is that a more pronounced inverse relationship obtains between life-span yields and quality for utilities and industrials when classified by the margin of safety than by the times-charges-earned ratio. Also, rail default rates were not so closely correlated with the ratio of net income to gross income as with the times-charges-earned ratio (cf. Tables 84 and

TABLE 89—Life-span Yields and Loss Rates for Bonds Classified by Times-Charges-Earned Ratio at Offering: Regular versus Total Offerings 1900–1943

	Offerings in All Earnings Classes	TIMES-CHARGES-EARNED RATIO					
		Under 1.0	1.0-1.4	1.5-1.9	2.0-2.9	3.0 and over	Information Lacking or Not Computed
Promised Yield							
Total Offerings							
Large issues	5.3%	6.2%	6.8%	4.7%	4.3%	4.0%	5.6%
Small issues	6.3	6.8	7.3	5.5	5.6	4.9	6.4
Regular Offerings							
Large issues	4.9	5.2	5.1	4.7	4.3	3.9	5.4
Small issues	5.8	6.0	5.8	5.5	5.0	4.9	6.0
Regular Offerings since 1920							
Large issues	4.9	5.3	5.3	4.8	4.2	3.9	5.8
Small issues	6.3	6.3	6.7	5.5	5.1	4.6	6.5
Realized Yield							
Total Offerings							
Large issues	5.4	6.0	6.4	5.0	5.1	4.9	5.4
Small issues	6.1	8.0	8.2	6.4	7.8	5.6	5.6
Regular Offerings							
Large issues	5.0	4.4	4.2	5.0	5.1	4.9	5.3
Small issues	5.3	5.8	5.5	6.4	6.6	5.6	5.1

TABLE 89
(concluded)

	Offerings in all Earnings Classes	Under 1.0	1.0–1.4	1.5–1.9	2.0–2.9	3.0 and over	Information Lacking or Not Computed
Regular Offerings since 1920							
Large issues	5.2%	4.8%	4.3%	5.4%	5.2%	4.9%	5.6%
Small issues	5.6	5.9	6.7	6.8	7.3	5.4	5.2
				Loss Rate			
Total Offerings							
Large issues	–0.1	0.2	0.4	–0.3	–0.8	–0.9	0.2
Small issues	0.2	–1.2	–0.9	–0.9	–2.2	–0.7	0.8
Regular Offerings							
Large issues	–0.1	0.8	0.9	–0.3	–0.8	–1.0	0.1
Small issues	0.5	0.2	0.3	–0.9	–1.6	–0.7	0.9
Regular Offerings since 1920							
Large issues	–0.3	0.5	1.0	–0.6	–1.0	–1.0	0.2
Small issues	0.7	0.4	0.0	–1.3	–2.2	–0.8	1.3

Based on Tables 193 and 194 of *Statistical Measures*, covering issues in the offerings experience sample. Yields and loss rates are weighted averages with par amounts of included offerings as weights. For issues still outstanding on January 1, 1944 liquidation is assumed at prices prevailing in the first quarter of that year. The ratio was not computed for guaranteed issues, issues of companies deriving their major income from rentals, or for railroads when the requisite earnings statements reflected years of federal operation (1918–20). Average annual income after taxes but before charges over the five-year period preceding offering date was related to the fixed charges for the first full year following offering.

TABLE 90—Life-span Yields and Loss Rates for Bonds Classified by Ratio of Net Income to Gross Income at Offering: Regular versus Total Offerings 1900–1943

	Offerings in All Earnings Classes	RATIO OF NET INCOME TO GROSS INCOME						
		Negative	Under 10 Percent	10–14 Percent	15–19 Percent	20–24 Percent	25 Percent and over	Information Lacking or Not Computed
Promised Yield								
Total Offerings								
Large issues	5.3%	8.9%	5.0%	5.1%	4.4%	4.6%	4.5%	5.6%
Small issues	6.3	8.0	7.0	5.5	6.0	5.3	5.9	6.3
Regular Offerings								
Large issues	4.9	4.7	4.6	4.5	4.4	4.6	4.5	5.4
Small issues	5.8	6.3	5.2	5.1	6.0	5.3	5.3	6.0
Regular Offerings since 1920								
Large issues	4.9	4.5	4.6	4.5	4.3	4.6	4.4	5.7
Small issues	6.3	6.3	5.8	5.5	6.1	5.0	5.1	6.5
Realized Yield								
Total Offerings								
Large issues	5.4	10.7	5.0	5.3	4.8	4.6	5.0	5.4
Small issues	6.1	11.4	8.2	6.2	7.1	5.7	6.7	5.5
Regular Offerings								
Large issues	5.0	5.3	4.2	5.1	4.8	4.6	5.0	5.3
Small issues	5.3	6.9	4.9	5.8	7.1	5.8	6.1	5.1
Regular Offerings since 1920								
Large issues	5.2	5.7	4.3	5.5	5.1	4.8	5.0	5.6
Small issues	5.6	5.9	5.4	6.2	7.7	5.7	6.6	5.2

TABLE 90
(concluded)

| | | | RATIO OF NET INCOME TO GROSS INCOME | | | | |
Offerings in All Earnings Classes	Negative	Under 10 Percent	10–14 Percent	15–19 Percent	20–24 Percent	25 Percent and over	Information Lacking or Not Computed
			Loss Rate				
Total Offerings							
Large issues −0.1%	−1.8%	0.0%	−0.2%	−0.4%	0.0%	−0.5%	0.2%
Small issues 0.2	−3.4	−1.2	−0.7	−1.1	−0.4	−0.8	0.8
Regular Offerings							
Large issues −0.1	−0.6	0.4	−0.6	−0.4	0.0	−0.5	0.1
Small issues 0.5	−0.6	0.3	−0.7	−1.1	−0.5	−0.8	0.9
Regular Offerings since 1920							
Large issues −0.3	−1.2	0.3	−1.0	−0.8	−0.2	−0.6	0.1
Small issues 0.7	0.4	0.4	−0.7	−1.6	−0.7	−1.5	1.3

Based on Tables 196 and 197 of *Statistical Measures*, covering issues in the offerings experience sample. Yields and loss rates are weighted averages with par amounts of included offerings as weights. For issues still outstanding on January 1, 1944 liquidation is assumed at prices prevailing in the first quarter of that year. The ratio was not computed for guaranteed issues, issues of companies deriving their major income from rentals, or for railroads when the requisite earnings statements reflected years of federal operation (1918–20). Net income (after charges and taxes) and gross income were averaged over the five-year period preceding offering date.

85), so that their average realized yields did not fall so precipitously with quality.

The loss rates of Tables 89 and 90 again exhibit what we have found to be the standard pattern, with larger capital loss generally indicated for the lower grade issues. Although both promised and realized yields are usually related inversely to quality, the inversion is normally less pronounced for the realized yields (owing to the higher default rates on low-quality issues), so that the loss rates are typically related inversely to quality. The same is necessarily true of the loss rates of Table 89, since the realized yields of certain classes of offerings (i.e. the large regular offerings) were less closely related to the times-charges-earned ratios than to other measures of quality. In Table 90, on the other hand, the realized yields are more regularly inverted, so that the loss rates exhibit a less regular pattern. Nevertheless, the loss rates were usually higher for the poorer quality issues.

Except for the rails, there is thus evidence that the life-span promised yields, realized yields, and loss rates behaved similarly when classified by the two earnings ratios at offering, and that they conformed to the standard patterns observed in earlier chapters. That is to say, promised yields, realized yields, and loss rates were generally higher for the lower quality issues. Because of the rails, the average realized yields for all regular offerings behaved atypically when classified by the times-charges-earned ratio, but reverted to the standard pattern (although rather weakly) when classified by the margin of safety. Conversely, the loss rates conformed more closely to the standard pattern when classified by the times-charges-earned ratio at offering than by the margin of safety.

The implications of the historical record are thus fairly obvious. The large investor who could stand the risks of default and of adverse market fluctuations would not, as a rule, have gained by sacrificing promised yield for an improvement in quality. On the contrary, he would have done best by buying high-yielding reorganization issues with very low earnings coverage. The small investor, however, would have been safer with issues on which fixed charges were earned a substantial number of times (the appropriate coverage depending largely upon the industry). High-quality issues not only had lower default rates than low-quality issues, but the returns obtained on them usually exceeded the yields promised at offering. As Table 89 indicates, for regular of-

ferings of the combined industries, and for total offerings of large issues, the point at which the loss rate was zero occurred when fixed charges were earned about one and one-half times. Capital losses occurred when fixed charges were earned less than one and one-half times, and capital gains when charges were earned a greater number of times.

It should be remembered, of course, in interpreting these results that our records are heavily weighted by the unfavorable experience of the 1930's. Because corporate bonds have been virtually default-free since 1944, the inverse relationship between quality and realized yield observed in the data would obtain, a fortiori, if the records were extended to cover all issues offered and extinguished up to the present time (1956).

LIEN POSITION

The term "lien position" is used here as a shorthand expression for a two-way classification of bond offerings: by the type of security underlying the issue (i.e. whether or not it was secured by a lien on assets), and by the rank of the issue at offering in the funded debt structure of the obligor. Type of security and rank of issue become important in the event of a default—or at least so we are told by the legal theorists who have molded a large part of our investment law. In theory, the bondholders (or a trustee acting in their behalf) have various rights in the event of a default. These include (1) the right of entry (the right of the trustee to take possession of the property securing the issue and to operate it for the benefit of the bondholders), (2) the right to sell the property without suit, and (3) the right to foreclose on the property and to dispose of it under the supervision of the courts. In practice, most of these rights may prove to be of little consequence, unless the liens running against the assets are extremely simple (e.g. bonds or other evidences of indebtedness secured by a direct lien on residential property). In the event of financial difficulties, the courts usually appoint a receiver to operate the property for the benefit of the various claimants (bondholders, general creditors, and equity interests) until the relative strength of the claims on assets (and earnings) can be determined. Nevertheless, experience teaches that the courts, when settling these claims, are not blind to the theoretical structure of the liens, and therein lies the merit of well-secured, prior-lien obligations in default situations.

In the section that follows we shall measure the volume of the different types of liens flowing onto the market and compare their default and yield experience.

Nature of the Data

Our breakdowns by lien position consist of a rearrangement of data in the original corporate bond records that were initially coded for tabulation in two ways: (1) by the type of security underlying the issue at date of first offering, i.e. secured or unsecured, and if secured, by a mortgage on real property, by collateral (stocks and bonds), by a leasehold (the right to occupy real property under a rental agreement, usually running beyond the maturity of the bond issue),[13] or by a combination of these types of security; and (2) by the rank of the issue in the obligor's funded debt at date of offering. Since a great deal of attention is given in prospectuses and investment manuals to the lien position of bond issues, the coverage of the data on this subject is virtually complete, full information on both type of security and rank at offering being obtained for 99.5 percent of the par amount of bonds floated in the period studied.

A breakdown of offerings by "type of security" as given in the original corporate bond records is presented in *Statistical Measures.* Since little difference was found in the behavior of the several types of secured obligations, they have been grouped together for the present report, so that the breakdown by security provision is simply into unsecured and secured issues. Unsecured corporate bond issues (debentures) accounted for about one-quarter of the total volume of bonds offered during the period studied, and were most important in the industrial field, where they accounted for almost 50 percent. Pure mortgage bonds, or those secured solely by a lien on real property, accounted for about one-third of the total; and "other" secured issues, which were backed by collateral

[13] During the period studied, no cases were found in which a leasehold was the sole security behind the issue; it was always accompanied either by a mortgage on real property, or by mortgage and collateral. Occasionally, under a leasehold, the mortgage was placed only on improvements made by the lessee (obligor) on the leased property (a pure leasehold mortgage). More often, the security under the leasehold consisted of the rights and benefits enjoyed by the lessee under the lease. For example, an entire railroad system may have been pledged, including owned and leased lines and trackage rights, or the owned property and mining leases of a steel corporation. A third type of leasehold occurred mainly among small divisional rail lines, where the obligor (lessor) pledged the lease as well as the property.

or leasehold security, or by combinations of such security with or without additional mortgage security, accounted for the remaining 40 percent.

One of the things we should like to know is whether the appraised value of the security behind a bond issue at offering bears any relation to subsequent performance, a matter that unfortunately cannot be determined from the records since no information was collected on value of security. (Estimation of such values was too difficult a task for a mass statistical investigation.) The records do, however, permit a comparison of the performance of unsecured issues with those secured by direct or indirect liens on physical assets. Our classification of issues as secured or unsecured is roughly of this type. Debenture bonds that make up the unsecured group constitute residual claims on assets that rank equally with the claims of the general creditors. Mortgage bonds are secured by liens on physical assets ranking prior to debentures. Bonds secured by both a leasehold and a mortgage are also secured by physical assets, and have the additional protection of the lease contract, the value of which depends partly on that of the leasehold property if pledged, and partly on the credit standing of the lessee or lessor. Bonds secured solely by collateral constitute the principal difficulty in distinguishing between issues secured by physical assets and by general creditors' claims, but in the aggregate such issues were fairly unimportant, comprising only 15 percent of the par-amount total of bonds offered in the period 1900–1943. Moreover, the collateral behind the 15 percent was frequently mortgage or leasehold bonds, which constitute a claim on physical assets. Bonds secured solely by stock collateral have some resemblance to debentures in that they are not backed by specific liens on real property. On the other hand, the value of the pledged stock not infrequently provides greater protection for the bondholders than the specific pledge of physical assets, so that there is justification for our treatment of such obligations as secured issues. The basic records contain no breakdown of collateral trust bonds by type of collateral security, but examination of some of the larger issues indicates that those secured solely by common stock were a rather small proportion of the total.

Within each of the two groups, secured and unsecured issues, offerings were ranked for purposes of this report in order of the priority of their claim on assets (see, for example, the caption of Table 91). Since first mortgage bonds are senior to second mort-

gage bonds, and second mortgage bonds are senior to third mort-
gage bonds or debentures, if an obligor had all three types of
obligations outstanding they were ranked as senior, intermediate,
and junior, respectively. If only two types were outstanding, they
were ranked as senior and junior; and if only one type, as senior.
The latter was the ranking assigned when either first mortgage
bonds or debentures comprised the entire funded debt of the obli-
gor.

Because the project records did not note the value of the under-
lying security, all issues of the same obligor secured by first mort-
gages on distinct pieces of property were classified as senior liens,
even though some of them may have fared better in a corporate
reorganization than others. The rank of collateral trust issues was
determined from the character of the security behind them. For
example, a collateral trust issue secured by first mortgage bonds
having a face value at least as great as that of the issue under
which they were pledged was treated as a secured senior issue.

When a mortgage bond had a multiple lien on assets, e.g. part
first lien, part second lien, etc., the rank assigned was that of the
junior lien. An exception was made only when the amount of
physical property securing the junior lien aggregated less than 10
percent of that securing the senior lien. This question arose
mainly in the railroad field and was decided on the basis of the
length of line subject to the different liens.

In ranking the obligations of holding companies, attention was
given to the structure of liens in the entire corporate system. For
example, if subsidiaries had bonds or preferred stock outstand-
ing, issues of a holding company were classified as junior if they
were unsecured or secured solely by the common stock of subsidi-
aries. The capital structure of the parent company was disregarded
when ranking the obligations of its subsidiaries, a treatment con-
sistent with our use of financial statements in other sections of
the book when discussing earnings ratios and the asset size of
obligors. The financial statements used in such cases covered the
obligor and its subsidiaries but not the parent company. Through-
out the analysis, equipment obligations were disregarded when
ranking issues at offering, as were bank loans and other obliga-
tions not normally considered part of the funded debt of the
corporation.

It will be observed that our procedure of ranking issues within
type-of-security class permits us to compare the behavior of issues

by rank independently of security provision and by security provision independently of rank, as well as by rank within security class. The importance of the different major classes is indicated by the fact that senior issues accounted for 52.4 percent of the par-amount total of offerings in the period 1900–1943, intermediate issues for 11.4 percent, and junior issues for 35.7 percent, with no information available for the remaining 0.5 percent. The corresponding proportions for the security-provision classes are: secured, 72.6 percent; unsecured, 26.9 percent; no information, 0.5 percent.

Security Provision, and Rank of Issue
in Obligor's Funded Debt, at Offering

Percentage distributions by lien position of the par-amount totals of corporate bonds offered in the different quadrennial periods are presented in Table 91. Since the information on lien position is virtually complete, no adjustment has been made to eliminate the few issues for which information could not be obtained. Like the other statistics on bond characteristics examined in this report, the data are universe estimates covering all straight corporate bonds offered in the period 1900–1943. They were derived by adjusting annually the data for small issues within major industry groups and combining with the data for large issues. The percentages at the foot of each section of the table represent the proportions of the par-amount totals of offerings in the full period 1900–1943 that fell in the indicated classes. Comparison of these percentages with the corresponding percentages for the quadrennial periods helps to reveal trends in the lien position of offerings.

The all-industries figures of Table 91 indicate a trend away from secured issues toward unsecured from 1900 through the late twenties, accelerating toward the close of that period, as investors became more optimistic about the outlook for debentures. A reverse trend, toward secured senior issues, is indicated in the depressed thirties and early forties, when investors required the additional security of adequate asset protection. As a result of these offsetting changes, the proportion of secured senior offerings (and of secured senior plus intermediate offerings) was approximately the same in 1940–43 as in 1900–1903; but the proportion of secured junior offerings was much lower and the proportion of debentures much higher.

Similar developments can be detected in the figures for the major industry groups, but different features predominate in each

case. For example, the pure first mortgage bond was rarely used by the railroads during the period studied. Only 24 percent of the par amount of rail bond offerings in the full period 1900–1943 represented secured issues of senior rank, as compared with 39 percent for industrials and 45 percent for utilities (Table 91). It should be remembered in interpreting these figures that the rails were already heavily indebted at the beginning of the period studied, and few had unencumbered assets against which they could issue additional senior liens. Instead, they issued blanket mortgages, having a first lien on unencumbered parts of the system, and a second or third lien on divisional lines (and hence classified as intermediate or junior issues in most cases; see the preceding section).

An explanation concerning earlier tables is pertinent here. Since for many of the intermediate, multiple-lien issues the senior lien afforded more protection to the bondholder than the intermediate or junior liens, or the senior lien became more important as underlying divisional bonds were retired, and since multiple liens bulked large in the total of intermediates, intermediate issues were combined with secured senior issues to form the category "senior liens" discussed in foregoing sections of the book on bond characteristics; cf. Tables 29, 41, and 56. It is interesting that the proportions of "senior liens" thus defined in the par-amount totals of bonds offered were practically the same for rails (51 percent) and for utilities (53 percent), but were lower for industrials (only 42.5 percent).

The trend of secured senior rail issues was downward before the Great Depression, but that of the senior and intermediate groups combined was practically horizontal. After 1931, however, investors gave more attention to the security behind their investments, and the volume of secured senior rail issues moved sharply higher. The railroads offered a larger proportion of secured junior issues than the other two industries over the full period studied and over nine of the eleven constituent periods. On the other hand, except for fairly mild and brief experiments with debentures in 1904–15, and again in 1928–31, the railroads rarely used the unsecured form of financing. It is significant that the periods in which debentures were used by the rails were those in which public confidence in the industry was high. Rail debentures in most cases were junior to other issues, and were frequently preceded by several prior liens.

TABLE 91—Percentage Distributions of Offerings by Lien Position, Four-year Periods 1900–1943

PERIOD OF OFFERING	SECURED ISSUES				UNSECURED ISSUES			Information Lacking	Total Par Amount (millions)
	Total	Senior	Inter-mediate	Junior	Total	Senior	Junior		
					All Issues				
1900–1903	95.7%	46.6%	14.2%	34.9%	3.9%	0.2%	3.7%	0.4%	$ 4,111.4
1904–1907	77.8	37.1	7.4	33.3	21.6	4.4	17.2	0.6	4,499.3
1908–1911	82.0	38.9	14.7	28.4	16.7	3.6	13.1	1.3	4,808.8
1912–1915	77.6	32.2	16.4	29.0	21.8	7.9	13.9	0.6	4,942.7
1916–1919	81.6	35.6	20.2	25.8	17.9	5.6	12.3	0.5	4,552.7
1920–1923	72.7	30.8	12.6	29.3	26.9	15.0	11.9	0.4	7,911.0
1924–1927	71.6	35.0	11.2	25.4	28.3	15.3	13.0	0.1	11,011.0
1928–1931	55.4	27.8	10.9	16.7	44.3	17.1	27.2	0.3	9,963.1
1932–1935	80.4	51.0	8.9	20.5	18.4	13.2	5.2	1.2	4,214.2
1936–1939	67.5	47.0	6.7	13.8	32.0	24.3	7.7	0.5	9,400.9
1940–1943	67.4	48.3	7.7	11.4	32.1	29.3	2.8	0.5	6,128.8
TOTAL	72.6	38.1	11.4	23.1	26.9	14.3	12.6	0.5	71,543.9
					Railroads				
1900–1903	93.2	31.0	16.1	46.1	6.7	0.0	6.7	0.1	1,996.4
1904–1907	76.1	21.2	10.8	44.1	23.5	0.2	23.3	0.4	2,255.8
1908–1911	79.0	23.9	26.2	28.9	20.5	0.5	20.0	0.5	2,210.5
1912–1915	78.2	14.5	27.5	36.2	21.8	0.7	21.1	0.0	2,189.0
1916–1919	96.4	20.0	45.6	30.8	3.5	0.0	3.5	0.1	1,473.7
1920–1923	94.4	20.2	23.1	51.1	5.6	2.1	3.5	0.0	1,591.1
1924–1927	93.8	22.8	30.5	40.5	6.1	0.2	5.9	0.1	1,940.6
1928–1931	75.6	19.8	30.6	25.2	24.3	0.3	24.0	0.1	2,074.8
1932–1935	88.5	41.4	38.3	8.8	4.7	0.0	4.7	6.8	596.2
1936–1939	84.5	33.1	29.0	22.4	14.3	0.0	14.3	1.2	1,438.6
1940–1943	99.4	46.0	36.2	17.2	0.0	0.0	0.0	0.6	828.2
TOTAL	85.6	24.3	26.6	34.7	13.9	0.4	13.5	0.5	18,594.9

TABLE 91
(continued)

PERIOD OF OFFERING	SECURED ISSUES				UNSECURED ISSUES			Information Lacking	Total Par Amount (millions)
	Total	Senior	Inter-mediate	Junior	Total	Senior	Junior		
					Public Utilities				
1900–1903	98.2%	54.7%	4.5%	39.0%	0.5%	0.1%	0.4%	1.3%	$ 1,105.8
1904–1907	88.8	57.9	3.7	27.2	10.8	2.2	8.6	0.4	1,492.9
1908–1911	88.5	49.5	5.4	33.6	10.2	4.5	5.7	1.3	1,732.8
1912–1915	83.8	46.8	10.4	26.6	15.5	6.3	9.2	0.7	1,929.1
1916–1919	74.5	43.7	7.7	23.1	25.1	3.7	21.4	0.4	2,020.9
1920–1923	84.7	31.2	16.2	37.3	15.2	2.5	12.7	0.1	3,134.2
1924–1927	76.7	34.0	11.2	31.5	23.3	7.1	16.2	0.0	5,529.2
1928–1931	53.9	27.3	8.3	18.3	46.1	12.4	33.7	0.0	5,406.8
1932–1935	86.9	53.9	5.7	27.3	12.8	7.9	4.9	0.3	2,445.5
1936–1939	80.6	61.8	2.6	16.2	19.1	12.0	7.1	0.3	5,178.2
1940–1943	80.9	63.0	2.8	15.1	18.9	17.3	1.6	0.2	3,450.8
TOTAL	77.7	45.3	7.5	24.9	22.0	8.5	13.5	0.3	33,426.2

TABLE 91
(concluded)

PERIOD OF OFFERING	SECURED ISSUES				UNSECURED ISSUES			Information Lacking	Total Par Amount (millions)
	Total	Senior	Inter-mediate	Junior	Total	Senior	Junior		
					Industrials				
1900–1903	97.9%	68.7%	20.9%	8.3%	2.0%	0.5%	1.5%	0.1%	$1,009.2
1904–1907	61.0	43.7	4.2	13.1	37.4	21.4	16.0	1.6	750.6
1908–1911	76.6	55.9	4.2	16.5	20.1	9.6	10.5	3.3	865.5
1912–1915	61.8	45.5	1.2	15.1	36.5	31.0	5.5	1.7	824.6
1916–1919	74.6	41.9	8.8	23.9	24.4	17.3	7.1	1.0	1,058.1
1920–1923	49.7	35.3	3.9	10.5	49.3	33.9	15.4	1.0	3,185.7
1924–1927	51.6	43.3	0.7	7.6	48.3	36.3	12.0	0.1	3,541.2
1928–1931	41.9	35.7	0.0	6.2	57.1	41.4	15.7	1.0	2,481.5
1932–1935	62.6	49.7	0.5	12.4	37.2	31.1	6.1	0.2	1,172.5
1936–1939	34.4	26.5	2.9	5.0	65.1	59.6	5.5	0.5	2,784.1
1940–1943	28.1	21.9	4.2	2.0	71.1	64.9	6.2	0.8	1,849.8
TOTAL	51.6	38.9	3.6	9.1	47.6	37.4	10.2	0.8	19,522.8

Based on Table 85 of *Statistical Measures*: par-amount data for all large (straight) corporate issues, and for 10 percent of small issues adjusted annually to universe totals. The term "senior" is inclusive of issues neither senior nor junior to other issues; i.e., constituting the obligor's entire funded debt. Intermediate issues are junior to some issues and senior to others. Secured issues are backed by mortgage, collateral, or leasehold.

Up to 1916, first mortgage bonds were very important in the public utility field because the financing in that period was mainly by street railway and other operating companies. Thereafter, debentures began to assume importance, in part because of the decline of street railway financing, and in part because of the rise of pyramided holding companies in the electric light and power field. The shift toward debentures reached its peak in 1928–31, at the apex of the holding company movement. Debentures then accounted for 46 percent, by volume, of all public utility offerings, and senior and intermediate secured issues for 36 percent, in contrast to 0.5 percent and 59 percent, respectively, in 1900–1903. In the thirties and early forties the proportion of senior and intermediate secured offerings of the utility group moved back to the 1900 level, nearly doubling, while the proportion of debentures declined by more than half.

In the main, the picture for industrials was unlike that of the other major industry groups. Throughout the period studied there was a gradual swing away from the secured types of industrial financing toward debentures. Loss of confidence in 1932–35, it is true, caused a return to secured senior issues, but it was short-lived, as industrial debentures held up well under the stresses of the thirties. The use of debentures by industrial corporations began early and persisted, and accounts in large part for the rise in the share of debentures in the all-industries totals. Debentures were first used by industrial corporations because of a rather widespread belief that industrial plant and equipment did not provide suitable security for a mortgage. Debenture financing grew in popularity as it became evident that a lien is unnecessary where earning power is adequate.

When presence or absence of a security provision is disregarded and attention is focused solely on the rank of the issue (i.e. when secured and unsecured issues are combined by rank), it appears that the rails had a smaller proportion of senior, and of senior plus intermediate, issues in the total of their offerings than either of the other two groups, and a higher proportion of junior issues (Table 91). For senior issues taken separately, that pattern prevailed in all periods; for senior plus intermediate issues, it prevailed in all periods except 1916–19 and 1924–35, when the rails changed places with the utilities.

The rank pattern of industrial issues was opposite to that of the rails, and the utilities held an intermediate position. Because

most of the industrial debentures had no issue ahead of them, the industrials led both of the other major industry groups in the proportions of senior issues and of senior plus intermediate issues in the total of their offerings (when the secured and unsecured issues are combined by rank). It follows that for the full period, 1900–1943, industrials as a class offered the smallest proportion of junior issues (19 percent of the total, as compared with 38 percent for utilities and 48 percent for railroads).

Security Provision and Business Cycles

Earlier it was noted that the share of unsecured obligations in total bond offerings was relatively high in the buoyant twenties and low in the depressed thirties. This observation raises the question whether similar changes can be detected within the shorter periods spanned by business cycles. Special annual series were derived for this purpose (for the method of derivation, see preceding sections on business cycles), and the results are presented in Charts 29 and 30 and Table 92. The various series cover the par amounts of secured and unsecured offerings for each major industry group, and the corresponding proportions of secured offerings in total offerings (secured plus unsecured).

The data for rail offerings indicate that the asset protection underlying them was systematically inverted with respect to the general business cycle, the secured offerings conforming inversely, and the unsecured offerings directly. Since it is known that the total volume of rail offerings was typically inverted with respect to general business during the period studied (cf. *Volume of Financing,* Table 16), and since the secured offerings of railroads were so important in that total, an inverted pattern was to be expected for secured rail offerings. It will be noted, however, that the percents of total rail offerings that were secured, which may be considered as independent of the inversion of the par-amount totals on which they are based, were also inverted with respect to general business (cf. Table 92), thus indicating that the inverted pattern of the secured rail offerings was not simply a reflection of the cyclical behavior of the total. The evidence provided by the unsecured rail offerings is even more striking, since that series conforms positively to the general business cycle while the total conforms negatively.

The cyclical swings in secured rail offerings were so pronounced, and the rails bulked so large in the all-industries figures

CHART 29—Par Amount of Secured and of Unsecured Bond Offerings, 1900-1943
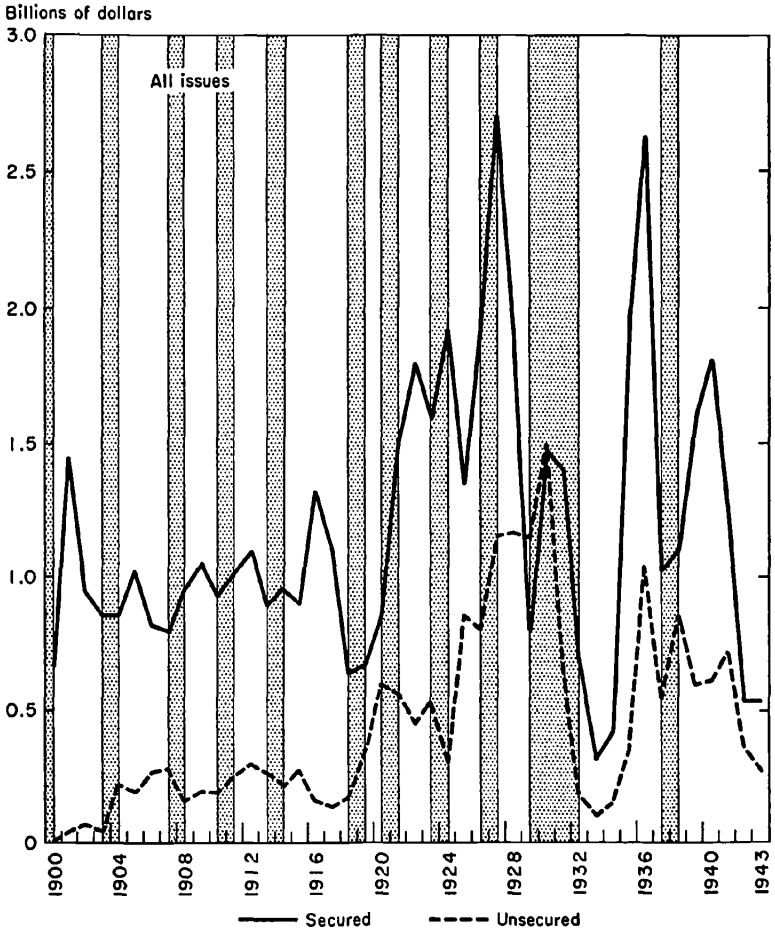
Billions of dollars

Secured ———   Unsecured ----

Universe estimates for straight bonds, yearly totals in par amount, from "Statistical Measures," Table 85. Secured issues are backed by mortgage, collateral, or leasehold.

Shaded areas, representing contractions in general business activity, and white areas, representing expansions, are from Arthur F. Burns and Wesley C. Mitchell's "Measuring Business Cycles" (National Bureau of Economic Research, 1946), p. 78.

CHART 29, concluded

Billions of dollars

Railroads

Public utilities
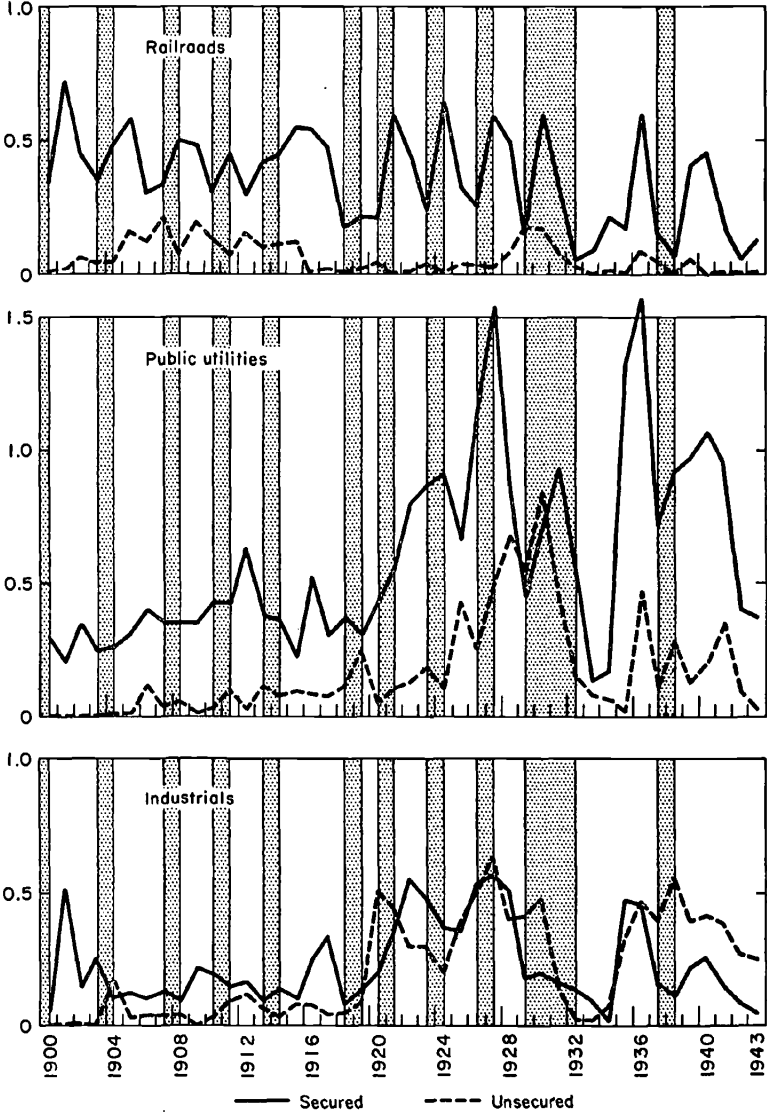
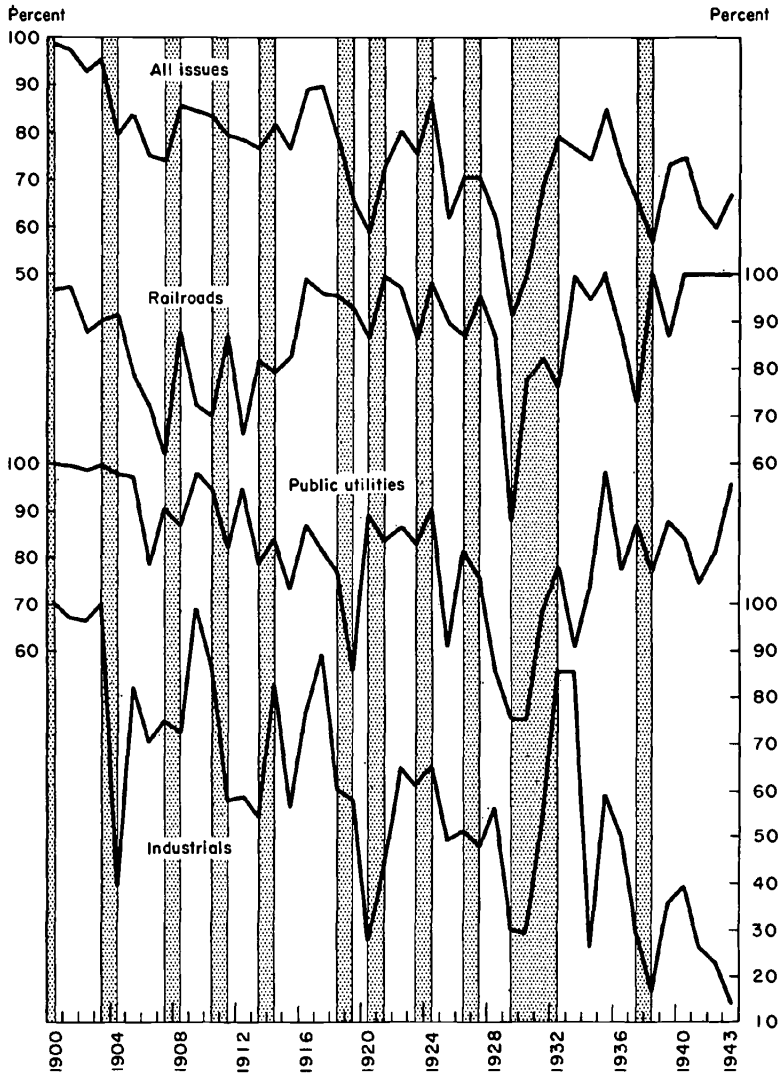Industrials

——— Secured   ---- Unsecured

CHART 30—Proportion of Offerings that were Secured, 1900-1943

Based on universe estimates for straight bonds, yearly totals in par amount, from "Statistical Measures," Table 85. Secured issues are backed by mortgage, collateral, or leasehold.

Shaded areas, representing contractions in general business activity, and white areas, representing expansions, are from Arthur F. Burns and Wesley C. Mitchell's "Measuring Business Cycles" (National Bureau of Economic Research, 1946), p. 78.

for secured offerings, that the latter series is also inverted with respect to general business cycles. The rails were less important, however, in the all-industries figures for unsecured offerings, and that series shows negligible conformity with business cycles. No visible conformity is indicated by the other conformity indexes of Table 92, but these do not take account of possible leads or lags at reference cycle turning points. An analysis of the timing

TABLE 92—Conformity Indexes for Secured Offerings, Unsecured Offerings, and Percent of Total Offerings That Were Secured, 1900–1943

	Expansion	*Contraction*	*Full Cycle*
	Secured Offerings		
All industries	−9	−80	−70
Railroads	−45	−60	−70
Public utilities	+27	−20	+10
Industrials	+27	+20	+30
	Unsecured Offerings		
All industries	+27	0	+10
Railroads	+73	+40	+70
Public utilities	+27	−40	−30
Industrials	−18	−20	−10
	Percent of Total Offerings That Were Secured		
All industries	−64	0	−20
Railroads	−80	−60	−80
Public utilities	−27	+40	+20
Industrials	−18	+20	−10

Based on annual par-amount data for straight corporate bonds from *Statistical Measures*, Table 85. These indexes do not take account of possible leads or lags at reference-cycle turning points. They are based on ten complete and one partial expansion and on ten contractions.

of the turning points of these series revealed several interesting features, the most important of which is that secured industrial offerings typically expanded from the trough of the general business cycle to mid-expansion (stages i to iii); and the conformity indexes, when recomputed on that basis, show high positive conformity (+64 for expansions, +60 for contractions, and +70 for the full cycle). The percents of total industrial offerings that were secured typically expanded from the mid-contraction stage of the business cycle to mid-expansion (stages vii to iii); and conformity

indexes constructed on that basis also show fairly high positive conformity (+27, +60, +40). As was to be expected from the high conformity indexes for rails in Table 92, both the secured rail offerings and the percents of total rail offerings that were secured usually expanded from peak to trough of the general business cycle, while unsecured rail offerings expanded from trough to peak. The other series—apart from the all-industries total of secured offerings, which typically expanded over stages v to iii of the cycle, and showed high negative conformity on that basis (−60, −60, and −68)—had mixed timing patterns and negligible conformity to business cycles.[14]

It would appear from this evidence, and from general knowledge of the psychology of the capital market, that investors have usually looked upon secured rail issues as high grade and unsecured rail issues as low grade, while the selection has been the reverse for industrials. A factor contributing to this appraisal is that the railroads were heavily indebted during most of the period studied, so that rail debentures were typically junior to other issues. Industrial corporations were not so heavily indebted as the rails, and their debentures were usually not subordinated to other issues. Industrial corporations with a good credit standing have had little difficulty in floating debentures, and usually only those with a low credit rating have been forced to offer investors the additional protection of a lien on assets. The behavior of secured and unsecured issues of railroad and industrial corporations over business cycles is thus consistent with our earlier conclusion that investors (and the investment rating agencies) have been prone to upgrade bond issues in good times and downgrade them in bad. In particular, investors were more willing to take rail debentures and the secured issues of industrial corporations of low credit standing when the business curve was rising than when it was falling. An additional consideration, which is more valid for rails than industrials, is that heavily indebted corporations frequently seek to improve their balance sheet ratios by offering common and preferred stock and debentures when they are acceptable

[14] An alternative expansion phase suggested by the analysis for unsecured rail offerings was from stages i to iii of the general business cycle, but the conformity indexes constructed on that basis are very similar to those presented in Table 92 (+55, +80, and +70). The timing analysis also indicated that unsecured public utility offerings frequently expanded over stages v to ix, or possibly over stages v to iii; but no marked improvement in conformity was shown when the indexes were recomputed accordingly.

to the market, thus reserving their prior-lien securities for emergency financing. Except for a brief and disastrous experiment with debentures by the pyramided holding companies in the late twenties, the public utility group was impervious to such swings in financing. Bonds of the electric utility operating companies, which account for the major share of total utility financing, have usually been well secured as to earnings and assets and have been generally acceptable to investors throughout successive stages of the business cycle. We cannot, of course, be sure that these conclusions are the correct ones, but they are consistent with the available evidence and with what is known about investor preferences.

Default Rates

The proportions of the par-amount totals of corporate bond offerings that subsequently went into default, classified by lien position at offering, are presented in Table 93. As might be anticipated from the fact that the lien position is designed to protect the bondholder in a default situation, rather than to reduce the risk of occurrence of a default, lien position at offering has had little direct bearing on the incidence of default. The differences that appear in Table 93 are related to the relative indebtedness and creditworthiness of obligors in the different industry groups, and only indirectly to the lien position of the issues at offering.

Within the secured group, for example, the default rates on junior issues were about as low as (and in the majority of cases were even slightly lower than) the default rates on senior issues. The existence of a junior lien frequently indicates a top-heavy debt structure, and investors are reluctant to purchase such issues unless they are offered by corporations with better than average credit standings. Secured issues of senior rank may also be offered by corporations with high credit standing; but they are offered by poorer risks as well, the prior lien being a kind of insurance against the large losses that might otherwise occur in a default situation. These various factors about cancel out in the all-industries aggregates, so that no pronounced differences appear among the default rates of senior and junior liens.

It will be noted in Table 93 that the large intermediate rail liens had much higher default rates than other secured rail issues. In the railroad field, the intermediate liens (issues senior to some but junior to others) were frequently offered by large, heavily indebted railroads with complex financial structures, and it was

TABLE 93—Proportions of Offerings 1900–1943 in Given Lien-position Classes at Offering That Went into Default before 1944

	All Regular Offerings	SECURED ISSUES				UNSECURED ISSUES			
		Total	Senior	Inter-mediate	Junior	Total	Senior	Junior	Information Lacking
Large issues, all industries	17.3%	18.8%	16.0%	29.5%	16.0%	13.6%	9.4%	18.2%	0.0%a
Railroads	28.1	29.2	22.8	40.8	23.6	20.6	29.2	20.6	0.0a
Public utilities	10.6	9.6	10.9	9.1	7.8	13.5	11.6	14.7	
Street railways	64.3	65.6	65.2	74.2	62.9	32.6	0.0	81.4	
All others	6.3	3.7	4.9	2.0	2.5	13.2	11.8	14.2	
Industrials	14.8	19.0	21.2	3.7	19.2	11.4	8.4	23.0	
Small issues, all industries	24.9	28.0	30.1	20.0	24.0	13.1	10.6	15.6	0.0a
Railroads	20.6	21.0	22.0	13.7	21.9	16.9	59.1a	4.1	
Public utilities	20.9	23.0	25.8	21.4	17.4	10.0	0.0	12.0	
Street railways	67.1	72.2	73.6	80.5	68.4	27.9a	0.0a	43.6a	
All others	13.2	14.3	20.9	0.0	1.8	7.9	0.0	9.3	
Industrials	33.7	44.3	42.2	90.9a	56.4	14.8	10.0	32.0	0.0a

Based on par-amount data for regular offerings in the offerings experience sample, *Statistical Measures*, Tables 200 and 201, and special supplementary tabulations. The term "senior" is inclusive of issues neither senior nor junior to other issues; i.e., constituting the obligor's entire funded debt. Intermediate issues are junior to some issues and senior to others. Secured issues are backed by mortgage, collateral or leasehold.

a Based on less than five offerings.

precisely those roads that defaulted on their obligations. A similar situation occurred in the street railway group, in this case for small as well as large issues. In financial structure many of the street railways were like the railroads, an intermediate lien being frequently a sign of a complex and top-heavy debt structure.

Analogous results are to be observed within the unsecured group, where the junior issues had higher default rates than senior issues (note, however, the exceptional behavior of the rails). Not infrequently, a junior unsecured issue, like an intermediate secured issue, indicates a complex capital structure and is a mark of financial weakness. It is interesting, however, that when the secured and unsecured issues are combined and the default rates are recalculated by rank of issue, the differences between junior and senior issues largely disappear. As has already been noted, the intermediate issues (all of which were, by definition, secured issues) had somewhat higher default rates than other issues.

Comparison of the default rates on secured and unsecured issues (Table 93) reveals that the debentures usually fared better than other issues. Railroads, street railways, and industrials had lower default rates on unsecured offerings than on any of the secured classes except intermediate issues among large industrials and small rails. Public utilities other than street railways, however, had higher default rates for unsecured than for secured issues (except senior issues among small utilities). The explanation is similar to that offered above concerning the favorable default record of the junior issues within the secured group. Except in the most buoyant times, only corporations with good credit standing (large earnings coverage, etc.) were able to float debentures successfully, and the securities of such obligors usually had an excellent default record, regardless of security provision. In periods of excessive optimism, however, weaker corporations with no mortgageable assets were occasionally able to float debentures successfully. Most of the utility debentures, for example, were offered by the large pyramided holding companies that mushroomed in the late twenties. The obligors were usually high-leverage corporations with no mortgageable assets and only the most tenuous claim on the earnings of the underlying operating utilities. As the high default rates for the large unsecured utility issues indicate, many of the holding company debentures went into default when utility earnings contracted in the thirties.

On the whole, the evidence of the default rates for the unse-

cured issues lends support to a view frequently expressed by earlier financial writers to the effect that debentures may be offered by very strong or very weak corporations, but that they are seldom offered by middle-of-the-road corporations.[15] The type of security offered investors by prospective borrowers, the rank of the obligation in the funded debt structure, etc., must be tailored to meet the requirements of investors at the time of offering. During most of the period covered by our records, only the strongest corporations—those with the highest earnings ratios and the most conservative capital structures—were able to satisfy bond investors with debentures. Occasionally, however, investor requirements were more easily met, even by the weakest of debentures. The essential point is that the default experience of the different types of issues is a reflection of the strengths and weaknesses of the corporations that floated them, and that these matters are related only in a roundabout way to the type of security offered. In short, there is little evidence from the default rates of Table 93 that lien position at offering, when considered independently of industry, earnings coverage, capital structure, etc., had a significant effect on the frequency with which corporate bonds went into default.

More detailed data on this matter are presented in Tables 94 and 95, which contain default rates for large issues based on the number of offerings in the different lien-position classes, and the corresponding number totals, cross-classified by the two earnings ratios at offering. (Because information-lacking entries are omitted, the number totals of the tables do not agree.) For all industries combined, the default rates were higher for total secured issues than for total unsecured, and the differences persisted with fair regularity throughout the different earnings classes. More pronounced differences appear within the two groups because of the high default rates for intermediate secured issues and for junior unsecured issues; and these differences also persist throughout most of the different earnings classes.

Again the data for major industries illuminate the all-industries totals. Clearly, the heavy incidence of default on intermediate rail bonds and on junior utility debentures (primarily issues of the

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[15] See, for example, William Z. Ripley's remarks on this point in his *Railroads, Finance and Organization* (New York, 1915), pp. 142 f.; also Arthur Stone Dewing's more cautious statement in *A Study of Corporation Securities* (New York, 1934), pp. 309 f., where it is applied mainly to public utilities.

TABLE 94—Proportions of Number of Offerings 1900–1943 in Given Lien-position and Times-Charges-Earned Ratio Classes at Offering That Went into Default before 1944, with Number of Offerings in Each Class

TIMES-CHARGES-EARNED RATIO	Secured and Unsecured	SECURED				UNSECURED		
		Total	Senior	Intermediate	Junior	Total	Senior	Junior
DEFAULT RATES								
Regular Offerings of Large Issues, All Industries								
Under 1.0	39.9%	40.7%	37.2%	53.8%	29.0%	35.7%	4.3%	51.1%
1.0–1.4	29.5	30.1	31.2	27.1	31.5	23.0	16.7	26.0
1.5–1.9	20.7	22.1	18.1	26.4	23.1	10.7	9.5	11.1
2.0–2.9	7.8	8.0	6.4	22.0	2.3	7.1	5.3	8.7
3.0 and over	3.7	3.1	3.4	3.2	2.4	4.6	5.6	0.0
TOTAL	21.1	22.6	18.8	30.4	20.9	13.4	6.8	20.3
Large Regular, Railroads								
Under 1.0	62.2	63.5	70.7	70.9	46.0	40.0		40.0
1.0–1.4	46.5	48.5	52.6	42.1	51.3	21.4		21.4
1.5–1.9	32.2	34.5	22.4	37.0	39.5	18.2	100.0	15.6
2.0–2.9	21.6	22.2	23.5	34.5	7.8	15.4		15.4
3.0 and over	2.2	2.3	0.0	4.8	0.0	0.0		0.0
TOTAL	40.4	42.3	44.3	43.9	39.5	20.9	100.0	20.0

TABLE 94
(continued)

DEFAULT RATES

TIMES-CHARGES-EARNED RATIO	Secured and Unsecured	SECURED				UNSECURED		
		Total	Senior	Intermediate	Junior	Total	Senior	Junior
		Large Regular, Public Utilities						
Under 1.0	26.1%	20.7%	20.0%	29.2%	13.7%	58.6%	16.7%	69.6%
1.0–1.4	15.3	14.6	19.5	12.7	11.5	25.8	9.1	35.0
1.5–1.9	13.3	14.6	14.8	15.4	13.7	0.0	0.0	0.0
2.0–2.9	0.9	1.0	1.9	0.0	0.0	0.0	0.0	0.0
3.0 and over	1.0	1.2	1.8	0.0	0.0	0.0	0.0	0.0
TOTAL	11.3	10.9	11.0	14.4	8.5	15.2	3.2	22.5
		Large Regular, Industrials						
Under 1.0	17.0	22.7	30.8	0.0	16.7	12.9	0.0	28.6
1.0–1.4	28.0	40.0	40.0			20.0	23.1	0.0
1.5–1.9	22.9	27.8	41.7	0.0	0.0	17.6	9.1	33.3
2.0–2.9	12.8	14.3	25.0	0.0	0.0	11.1	8.3	16.7
3.0 and over	6.6	8.1	7.3	0.0	12.5	5.8	6.6	0.0
TOTAL	11.9	15.7	20.2	0.0	6.7	9.3	7.5	16.3

TABLE 94
(continued)

NUMBER OF OFFERINGS, DEFAULTS AND NONDEFAULTS

TIMES-CHARGES-EARNED RATIO	Secured and Unsecured	SECURED				UNSECURED		
		Total	Senior	Intermediate	Junior	Total	Senior	Junior
Regular Offerings of Large Issues, All Industries								
Under 1.0	436	366	129	130	107	70	23	47
1.0–1.4	875	801	237	247	317	74	24	50
1.5–1.9	658	574	216	159	199	84	21	63
2.0–2.9	548	464	202	91	171	84	38	46
3.0 and over	463	289	175	31	83	174	144	30
TOTAL	2,980	2,494	959	658	877	486	250	236
Large Regular, Railroads								
Under 1.0	180	170	41	79	50	10	0	10
1.0–1.4	387	359	78	121	160	28	0	28
1.5–1.9	239	206	49	81	76	33	1	32
2.0–2.9	139	126	17	58	51	13	0	13
3.0 and over	45	43	7	21	15	2	0	2
TOTAL	990	904	192	360	352	86	1	85

TABLE 94
(concluded)

NUMBER OF OFFERINGS, DEFAULTS AND NONDEFAULTS

TIMES-CHARGES-EARNED RATIO	Secured and Unsecured	SECURED				UNSECURED		
		Total	Senior	Intermediate	Junior	Total	Senior	Junior
Large Regular, Public Utilities								
Under 1.0	203	174	75	48	51	29	6	23
1.0–1.4	463	432	149	126	157	31	11	20
1.5–1.9	384	350	155	78	117	34	9	25
2.0–2.9	331	296	161	32	103	35	14	21
3.0 and over	207	172	113	7	52	35	22	13
TOTAL	1,588	1,424	653	291	480	164	62	102
Large Regular, Industrials								
Under 1.0	53	22	13	3	6	31	17	14
1.0–1.4	25	10	10	0	0	15	13	2
1.5–1.9	35	18	12	0	6	17	11	6
2.0–2.9	78	42	24	1	17	36	24	12
3.0 and over	211	74	55	3	16	137	122	15
TOTAL	402	166	114	7	45	236	187	49

Default rates are from special tabulations of the National Bureau of Economic Research, and are based on offerings of all large (straight) regular corporate issues as given in the second main section of the table. For definition of times-charges-earned ratio, see note to Table 81; of security provision, note to Table 91.

TABLE 95—Proportions of Number of Offerings 1900–1943 in Given Lien Position and Ratio of Net Income to Gross Income Classes at Offering That Went into Default before 1944, with Number of Offerings in Each Class

RATIO OF NET INCOME TO GROSS INCOME	Secured and Unsecured	SECURED				UNSECURED		
		Total	Senior	Intermediate	Junior	Total	Senior	Junior
				DEFAULT RATES				
			Regular Offerings of Large Issues, All Industries					
Negative	33.0%	38.3%	34.5%	56.0%	25.9%	16.0%	6.7%	30.0%
Under 10%	33.0	38.0	33.9	47.4	32.5	12.7	6.5	24.5
10–14	25.4	28.2	24.2	26.8	33.2	13.0	7.3	17.6
15–19	18.3	19.0	13.6	28.5	18.2	13.0	8.3	15.1
20–24	15.5	14.0	13.2	17.4	12.1	25.0	4.8	34.9
25% and over	5.5	5.7	6.0	10.3	3.2	4.0	10.0	0.0
TOTAL	21.5	23.0	18.9	30.8	21.3	13.7	7.0	19.8
			Large Regular, Railroads					
Negative	48.3	49.1	62.5	60.9	22.2	0.0		0.0
Under 10%	45.0	45.3	45.7	48.4	41.4	40.9		40.9
10–14	40.1	42.5	56.1	26.9	47.2	24.2		24.2
15–19	35.3	38.4	38.1	46.8	28.8	9.1		9.1
20–24	40.2	42.0	23.5	47.1	46.7	27.3	100.0	20.0
25% and over	14.7	15.7	9.1	16.2	18.2	0.0		0.0
TOTAL	39.7	41.2	43.7	42.1	39.0	23.4	100.0	22.6

TABLE 95
(continued)

DEFAULT RATES

RATIO OF NET INCOME TO GROSS INCOME	Secured and Unsecured	SECURED				UNSECURED		
		Total	Senior	Intermediate	Junior	Total	Senior	Junior
Large Regular, Public Utilities								
Negative	13.3%	14.3%	0.0%	0.0%	28.6%	0.0%	9.1%	0.0%
Under 10%	28.6	30.5	32.1	48.4	15.9	8.3	0.0	0.0
10–14	17.0	17.9	13.9	26.8	16.3	9.8	13.3	13.3
15–19	10.7	9.9	7.7	9.5	13.7	17.8	0.0	20.0
20–24	9.0	6.3	11.4	4.9	0.9	27.7	0.0	39.4
25% and over	2.9	3.2	5.4	3.2	0.8	0.0	0.0	0.0
TOTAL	11.6	11.2	11.0	16.3	8.4	14.4	4.8	19.3
Large Regular, Industrials								
Negative	15.2	10.0	0.0	0.0	50.0	17.4	6.7	37.5
Under 10%	9.0	11.6	16.3	0.0	0.0	7.4	6.1	11.5
10–14	15.9	35.0	38.5		28.6	8.2	9.1	0.0
15–19	8.7	15.4	40.0		0.0	0.0	0.0	0.0
20–24	25.0	50.0	33.3		66.7	0.0	0.0	
25% and over	18.7	16.7	16.7			20.0	22.2	0.0
TOTAL	12.1	17.7	20.5	0.0	13.9	8.7	7.3	14.6

TABLE 95
(continued)

NUMBER OF OFFERINGS, DEFAULTS AND NONDEFAULTS

RATIO OF NET INCOME TO GROSS INCOME	Secured and Unsecured	SECURED				UNSECURED		
		Total	Senior	Intermediate	Junior	Total	Senior	Junior
Regular Offerings of Large Issues, All Industries								
Negative	106	81	29	25	27	25	15	10
Under 10%	719	577	183	194	200	142	93	49
10–14	669	546	198	149	199	123	55	68
15–19	668	591	242	151	198	77	24	53
20–24	471	407	152	115	140	64	21	43
25% and over	439	389	166	68	155	50	20	30
TOTAL	3,072	2,591	970	702	919	481	228	253
Large Regular, Railroads								
Negative	58	57	16	23	18	1	0	1
Under 10%	402	380	81	159	140	22	0	22
10–14	247	214	41	67	106	33	0	33
15–19	207	185	42	77	66	22	0	22
20–24	92	81	17	34	30	11	1	10
25% and over	75	70	11	37	22	5	0	5
TOTAL	1,081	987	208	397	382	94	1	93

TABLE 95
(concluded)

NUMBER OF OFFERINGS, DEFAULTS AND NONDEFAULTS

RATIO OF NET INCOME TO GROSS INCOME	Secured and Unsecured	SECURED				UNSECURED		
		Total	Senior	Intermediate	Junior	Total	Senior	Junior
Large Regular, Public Utilities								
Negative	15	14	6	1	7	1	0	1
Under 10%	140	128	53	31	44	12	11	1
10–14	353	312	144	82	86	41	11	30
15–19	438	393	195	74	124	45	15	30
20–24	367	320	132	81	107	47	14	33
25% and over	348	313	149	31	133	35	11	24
TOTAL	1,661	1,480	679	300	501	181	62	119
Large Regular, Industrials								
Negative	33	10	7	1	2	23	15	8
Under 10%	177	69	49	4	16	108	82	26
10–14	69	20	13	0	7	49	44	5
15–19	23	13	5	0	8	10	9	1
20–24	12	6	3	0	3	6	6	0
25% and over	16	6	6	0	0	10	9	1
TOTAL	330	124	83	5	36	206	165	41

Default rates are from special tabulations of the National Bureau of Economic Research, and are based on offerings of all large (straight) regular corporate issues as given in the second section of the table. For definition of net income to gross income, see note to Table 82; of security provision, note to Table 91.

pyramided holding companies) are the main factors. Within the respective earnings-coverage classes, the default rates for secured rail issues did not differ significantly from one another, but the high default rate for rails generally, and the dominant position of the rails in the total of all intermediate issues, raised the default rates for total intermediates above those of other secured issues. For the utility group, the default rates classified by lien position showed significant variation, primarily because of the heavy defaults on the junior debentures of the pyramided holding companies. The cause, however, was not lien position per se, but the fact that fixed charge coverage was too low on these high-leverage obligations. For the industrial and rail groups, on the other hand, debentures had a much better record than secured issues. Industrial debentures comprised a sufficiently large part of all debentures to bring the default rates on total unsecured issues below those on the secured issues. Among issues of public utilities whose ratio of net income to gross income was less than 15 percent, the higher default rates for secured than for unsecured offerings were largely the result of defaults on secured intermediate street railway issues. On the whole it appears that the differences observed in the default rates for the different lien-position classes reflected largely industry differences in risk and in the rank and type of issue offered by the respective industries.[16]

Default Losses

Earlier in the chapter, earnings coverage at offering was found to be systematically related to the rate of subsequent default but not to the experience on bonds after default. The question now is whether or not price and yield experience after default is related to the lien position of an issue at offering. To the extent that the lien position actually performs its expected function in the investment process, secured issues should fare better after default than debentures and junior liens. Evidence on this matter is presented

[16] Chi-square tests similar to those discussed in note 12 were applied by converting the default rates of Tables 94 and 95 into numbers of defaulted issues, and combining where necessary to obtain a sufficiently large number of observations. The hypothesis tested was that of constancy of default rates within rows of the tables (i.e., a constant default rate, $p_{ij} = p_{i.}$, for each earnings-coverage class). Significant results were obtained consistently for the combined industries and for utilities, but not for rails or industrials. Tests for differences in default rates classified by the two earnings ratios within given lien-position classes ($p_{ij} = p_{.j}$) yielded significant results in virtually all cases.

in Tables 96 and 97, which contain price averages for defaulted issues at date of default, values of receipts after default discounted at 3 percent and at 6 percent, and realized yields over significant periods in the life span of defaulted issues, each classified by lien position at offering. As in other tables of this type, the data are simple unweighted averages, and are presented separately for defaulted issues in the large and small issues samples.

TABLE 96—Market Prices at Default, Discounted Values of Receipts after Default, and Realized Yields after Default for Bonds Classified by Lien Position at Offering, 1900–1943

LIEN POSITION	Number of Issues Used for Prices and Receipts	Average Price at Default	RECEIPTS DISCOUNTED AT		Realized Yield, Default to Extinguishment
			3 Percent	6 Percent	
		Large Issues			
All issues	581	43	63	53	20.0%
Secured issues	453	44	66	55	18.2
Senior	228	45	67	56	17.4
Intermediate	89	43	62	51	18.4
Junior	136	45	66	55	19.4
Unsecured issues	125	35	55	48	26.6
Senior	52	39	61	53	30.0
Junior	73	33	52	44	24.2
Information lacking	3	58	62	49	11.2
		Small Issues			
All issues	137	40	63	54	26.7
Secured issues	124	39	64	55	27.0
Senior	95	40	64	55	25.5
Intermediate	6	56	88	75	18.5
Junior	23	32	58	50	35.4
Unsecured issues	13	44	55	48	24.2
Senior	9	47	57	50	19.3
Junior	4	37	50	44	35.2
Information lacking	0				

From Table 226 of *Statistical Measures*, covering issues in the default experience sample. Prices, discounted values, and yields are unweighted averages. Receipts include liquidating values of securities still outstanding on January 1, 1944 at prices prevailing in the first quarter of that year. The term "senior" is inclusive of issues neither senior nor junior to other issues; i.e., constituting the obligor's entire funded debt. Intermediate issues are junior to some issues and senior to others. Secured issues are backed by mortgage, collateral, or leasehold.

Concerning large issues, Table 96 indicates that for the group of secured issues that defaulted, there were no pronounced differences among issues of different rank, either in the average market prices at default, in receipts discounted back to date of default at 3 percent and at 6 percent, or in yields realized by investors who purchased at default and held to extinguishment. Unsecured large issues showed a pronounced price weakness at default, with the junior issues having the poorest record in that size group. Discounted values of future receipts were also lower at default for unsecured than for secured large issues, but not so low as the market prices at default, so that investors who purchased at default and held to extinguishment obtained higher returns on the debentures. An industry breakdown of the data (not presented in Table 96) shows that the price weakness of the debenture group at default was caused primarily by the large public utility issues (forty-five in number), 87 percent of which were obligations of pyramided holding companies. While the average price at default for large utility debentures was only 26 compared to 51 for secured issues of the same group, among rails the debentures were priced almost as high as the secured issues (42 as against 44), and among industrials the debentures were priced even higher (41 against 36). Likewise, the discounted values of receipts were much higher for secured issues than for unsecured issues in the large public utility group; for large rails and industrials the differences were also in favor of the secured issues but were not so great. Virtually the same industry differences prevailed within the sample of small defaulted issues, but since only two small public utility debentures in the sample defaulted, they did not distort the general picture to the same extent.

The statistics of Table 96 therefore indicate that the payouts on unsecured issues after default were on the average not so large as on secured issues, and that the prices on the large unsecured issues were particularly low at date of default, the debentures of the pyramided public utility holding companies being the worst offenders in both respects. On the other hand, prices generally were so low at default that with most types and ranks of issues an investor purchasing at default could obtain extremely high returns if the bonds were held to extinguishment.

Further evidence to the same effect is presented in Table 97 in the form of average promised yields on defaulted issues at date of first offering (the principal offering for most issues), and average

realized yields and loss rates calculated from dates of first offering to default and first offering to extinguishment.

For virtually all lien-position classes, negative yields were realized on issues sold at default (and heavy losses were incurred),

TABLE 9.7—Yields and Loss Rates up to Default and over Life Span of Issues Defaulting 1900–1943 Classified by Lien Position at Offering

LIEN POSITION	*Number of Issues*	*Promised Yield at Offering*	FIRST OFFERING TO DEFAULT		FIRST OFFERING TO EXTINGUISHMENT	
			Realized Yield	*Loss Rate*	*Realized Yield*	*Loss Rate*
			Large Issues			
All issues	549	6.4%	−3.4%	9.8%	2.3%	4.1%
Secured issues	428	6.1	−1.9	8.0	2.8	3.3
Senior	212	6.2	−3.6	9.8	2.3	3.9
Intermediate	87	5.6	−0.2	5.8	2.5	3.1
Junior	129	6.2	−0.2	6.4	3.6	2.6
Unsecured issues	119	7.4	−9.2	16.6	0.6	6.8
Senior	51	7.0	−10.6	17.6	0.4	6.6
Junior	68	7.7	−8.2	15.9	0.8	6.9
Information lacking	2	3.6	2.4	1.2	2.9	0.7
			Small Issues			
All issues	119	7.8	−4.0	11.8	2.4	5.4
Secured issues	107	7.6	−3.9	11.5	2.7	4.9
Senior	86	7.8	−3.0	10.8	3.0	4.8
Intermediate	4	5.5	0.7	4.8	3.2	2.3
Junior	17	7.0	−9.5	16.5	1.0	6.0
Unsecured issues	12	9.7	−5.0	14.7	0.6	9.1
Senior	8	11.4	−2.7	14.1	1.6	9.8
Junior	4	6.4	−9.5	15.9	−1.5	7.9
Information lacking	0					

From Table 225 of *Statistical Measures*, covering issues in the default experience sample. Yields and loss rates are unweighted averages. For issues still outstanding on January 1, 1944 liquidation is assumed at prices prevailing in the first quarter of that year. The term "senior" is inclusive of issues neither senior nor junior to other issues; i.e., constituting the obligor's entire funded debt. Intermediate issues are junior to some issues and senior to others. Secured issues are backed by mortgage, collateral, or leasehold.

but the experience on the secured issues was not so poor as on the debentures. For the large issues the average yield realized from first offering to default was −1.9 percent for secured issues, and −9.2 percent for unsecured; and for the corresponding classes of small issues, −3.9 percent and −5.0 percent. The heavy losses

on the large debentures were caused partly by the price weakness of the utilities at date of default and partly by the short period for which several of the industrial debentures were outstanding before they went into default. Large senior secured issues had poorer records than the intermediates and juniors when sold at default. Among small issues, however, senior secured issues fared better than junior.

Somewhat more telling evidence against the defaulted debentures is provided by the life-span yields (i.e. yields from first offering to extinguishment), since such yields are unaffected by the particular prices that happened to prevail at date of default. Except for small junior liens, the life-span yields on the secured issues were similar for the different groups, and were uniformly higher than on the debentures. The average life-span yield on debentures that defaulted (large and small issues) was only 0.6 percent, less than one-quarter of the yield obtained on the secured issues that defaulted. Moreover, since the average yield promised was higher for the debentures than for the secured issues, and since the average yield realized was lower, the difference (the loss rate) was much higher for the unsecured issues (about twice as high, on the average, for both the large and small issues). The breakdowns of the secured and unsecured defaulting issues by rank of issue reveal surprisingly small differences among life-span yields and loss rates, particularly in view of the small number of issues included in several of the classes. The similarity of the averages within the secured and unsecured groups tends to substantiate the striking differences observed between the over-all averages of the two classes of defaulted issues.

The underlying industry breakdowns for large issues (Tables 225 and 226 in *Statistical Measures*) provide additional evidence that secured issues generally fared better than unsecured in default situations. Rail debentures were exceptional among defaults in that they had higher life-span yields than secured rail issues (4.6 percent versus 3.1 percent), but this was caused by the much higher yields promised on the rail debentures at offering (10.7 percent versus 5.8 percent for the secured issues) and not by superior performance after default: the value of receipts thereafter discounted at 3 percent was only 58 for rail debentures, as against 64 for the corresponding group of secured issues. For defaulted large issues in the other major industry groups, life-span yields realized on secured bonds were better than on unsecured

(2.9 percent for secured utility issues and —1.5 percent for unsecured; 1.8 percent for secured industrial issues and 0.9 percent for unsecured). These differences are largely explained by the higher payouts on the secured issues after default. For large utility issues, the average value of receipts after default discounted at 3 percent was 70 for the secured issues and only 47 for the unsecured (mostly, issues of the pyramided holding companies). For large industrials, the corresponding discounted values were 63 for secured issues, and 61 for unsecured issues.

The evidence thus leaves little room for doubt that secured issues worked out better in default situations than unsecured issues. For the combined industries the average yields realized on defaulted issues if held from offering to extinguishment were positive for each of the different lien-position classes except the unsecured small issues of junior rank, but were much lower for unsecured than for secured issues. In each size-industry class other than small rails, unsecured issues had a poorer record than secured issues with respect to cash payouts after default, and their life-span yields were lower in all classes except large rails. Subclasses by rank of issue within unsecured and secured obligations that defaulted show further differences in average performance, but with no consistent pattern from group to group.

Average Life-span Yields and Loss Rates
(nondefaulted and defaulted issues combined)

Thus far we have found that while unsecured issues in most industry-size classes had lower default rates than secured issues, the unsecured issues usually had poorer yield records after default. This leaves unresolved the question of how these two factors— which affected oppositely the two types of issues—were combined in the over-all results. The evidence on this matter is summarized in Table 98 in the form of weighted average promised yields, realized yields, and loss rates covering defaulted plus nondefaulted issues.

In the sample of large issues, the yields promised on the secured and unsecured issues at offering were quite similar, but the underlying industry breakdowns (Tables 199 and 200 in *Statistical Measures*) show a mixed pattern. For all regular offerings, and for regular offerings since 1920, the yields promised on utility debentures were higher than on secured issues; but the reverse was true for large rails and industrials. The differences among

realized yields on secured and unsecured issues were small for large issues of the combined industries, but were more pronounced within major industry groups and were in favor of the secured issues in eleven out of twelve comparisons of the averages.[17] The industry differences are not fully reflected in the all-industries averages of Table 98, since the life-span yields realized on industrials (both secured and unsecured) were much higher than on other issues, and the industrials accounted for almost half of the par-amount total of unsecured offerings of large issues. Within major industry groups, the capital loss rates from offering to extinguishment for large issues were also generally higher (or capital gain rates lower) on unsecured than on secured offerings, the differences in this respect being reflected more or less faithfully in the all-industries average of the table.[18] The evidence therefore indicates that the over-all yield performance of the unsecured large issues was generally inferior to that of the secured issues. The higher yields promised on some of the large debentures at offering and the lower default rates on them were more than counterbalanced in the period studied by the poorer yields realized on debentures that went into default.

The reverse pattern held for small issues (Table 98). While the yields promised at offering were not greatly different as between secured and unsecured issues, the life-span realized yields were considerably higher on the unsecured issues, and the loss rates were considerably lower; and these patterns were repeated with great regularity within the major industries.[19] The reason for this

[17] The twelve comparisons were for total offerings, regular offerings, and regular offerings since 1920, each subclassified into four industry groups: railroads, street railways, other public utilities, and industrials. In the twelfth comparison (regular industrial offerings since 1920), the averages for secured and unsecured issues were equal.

[18] For the twelve classes of issues mentioned in footnote 17, the average loss rates were higher for unsecured than for secured large issues in nine comparisons (all except the three for industrials). The industrials differed from the other industry groups in that the promised yields for the three groups compared were consistently lower on unsecured than on secured issues. For total offerings and all regular offerings of industrials, the realized yields of the unsecured offerings were also lower, and by the same amount as the promised yields, so that the loss rates for the secured and unsecured groups were equal. For regular industrial offerings since 1920, the realized yields on secured and unsecured large issues were equal, so that the loss rate was lower for the unsecured issues.

[19] Within each of the twelve groups mentioned in footnote 17 the average yield realized was higher for unsecured than for secured small issues. The capital loss rates on the unsecured issues were lower (or capital gain rates

TABLE 98—Life-span Yields and Loss Rates for Bonds Classified by Lien Position at Offering: Regular versus Total Offerings 1900–1943

	All Included Offerings	LIEN POSITION						
		SECURED ISSUES				Unsecured Issues	Information Lacking
		Total	Senior	Intermediate	Junior		
Promised Yield								
Total Offerings								
Large issues	5.3%	5.3%	5.2%	5.3%	5.3%	5.3%	6.0%[a]
Small issues	6.3	6.3	6.4	5.4	6.3	6.4	7.0[a]
Regular Offerings								
Large issues	4.9	4.9	4.8	4.9	5.0	5.0	6.0[a]
Small issues	5.8	5.7	5.7	5.3	5.9	6.2	7.0[a]
Regular Offerings since 1920								
Large issues	4.9	4.9	4.7	5.1	5.1	5.0	
Small issues	6.3	6.2	6.1	6.2	6.4	6.4	7.0[a]
Realized Yield								
Total Offerings								
Large issues	5.4	5.4	5.7	4.8	5.5	5.3	6.4[a]
Small issues	6.1	5.8	5.9	5.8	5.4	7.3	17.0[a]
Regular Offerings								
Large issues	5.0	5.0	5.2	4.4	5.0	5.0	6.4[a]
Small issues	5.3	4.9	4.8	5.7	5.0	6.7	17.0[a]
Regular Offerings since 1920								
Large issues	5.2	5.3	5.3	4.7	5.5	5.1	
Small issues	5.6	5.0	4.7	7.0	5.3	7.0	17.0[a]

TABLE 98
(concluded)

	All Included Offerings	SECURED ISSUES				Unsecured Issues	Information Lacking
		Total	Senior	Intermediate	Junior		
				Loss Rate			
Total Offerings							
Large issues	−0.1%	−0.1%	−0.5%	0.5%	−0.2%	0.0%	−0.4%ᵃ
Small issues	0.2	0.5	0.5	−0.4	0.9	−0.9	−10.0ᵃ
Regular Offerings							
Large issues	−0.1	−0.1	−0.4	0.5	0.0	0.0	−0.4ᵃ
Small issues	0.5	0.8	0.9	−0.4	0.9	−0.5	−10.0ᵃ
Regular Offerings since 1920							
Large issues	−0.3	−0.4	−0.6	0.4	−0.4	−0.1	
Small issues	0.7	1.2	1.4	−0.8	1.1	−0.6	−10.0ᵃ

Based on Tables 199 and 200 of *Statistical Measures*, covering issues in the offerings experience sample. Yields and loss rates are weighted averages with par amounts of included offerings as weights. For issues still outstanding on January 1, 1944 liquidation is assumed at prices prevailing in the first quarter of that year. Secured issues are backed by mortgage, collateral, or leasehold. The term "senior" is inclusive of issues neither senior nor junior to other issues; i.e., constituting the obligor's entire funded debt. Intermediate issues are junior to some issues and senior to others.

ᵃ Based on less than five offerings.

reversal of pattern is revealed by the default rates of Table 93. The lower yields realized on the secured small issues held from offering to extinguishment, and the higher losses suffered, reflect the high rate at which they went into default. Actually, as Table 97 shows, average life-span yields on defaulted debentures (both small issues and large) were poorer than on secured issues; but the default rate was sufficiently low on the small debentures to offset the adverse effect on the over-all yield. It appears that small debentures were floated by obligors with better than average credit standings, and once floated, went into default infrequently. Conversely, secured small issues were frequently offered by obligors with a lower than average credit standing, and these went into default more frequently. As it worked out, for small issues the credit rating of the obligor was more important than the security, so that the average realized yield was higher on debentures than on other issues. With large issues, however, the reverse was true: the default rate of the debentures was not so low (relative to that on secured issues) as to offset the lack of security, and they fared worse, on the average, than other issues.

Turning briefly to the ranks of the obligations within the secured-issue group (Table 98), it appears that there was little difference in life-span yield performance between the senior and junior liens. The intermediate liens, however, show an opposite pattern for the realized yields of large and small issues. Intermediate liens among large rails and street railways had exceptionally high default rates (cf. Table 93), which lowered the average realized yield for the combined industries. Conversely, the default rates on intermediate liens among small rails and small utilities other than street railways (which together accounted for 82 percent of the intermediate liens among small issues) were quite low, and this raised the average realized yield for the combined industries.

It appears, in conclusion, that the salvage value on defaulted debentures was generally lower than on defaulted secured issues, so that the average life-span yield realized on defaulted debentures was generally lower. This factor worked against the debentures in every group studied. Where the default rate on the debentures was high (e.g. large rails and street railways), the over-all yield realized

were higher) in ten of the twelve comparisons, were equal once, and were higher once.

on debentures—nondefaulting and defaulting issues combined—was below that on secured issues. But where the default rate on the debentures was low (e.g. the small issues generally), the over-all yield realized was high. There is nothing in the records to indicate, however, that the default rate was significantly affected by the security provision or the rank of the obligation at offering, when considered independently of the creditworthiness of the issuer.

The chief implication of this chapter is that proper attention to the protection afforded by assets and earnings is generally rewarded by lower-than-average default rates and higher-than-average yields realized on issues that suffer defaults. These are the factors that are usually recommended by investment handbooks for the attention of small investors. The evidence would seem to indicate, however, that large institutional investors may by proper selection substitute earnings coverage for lien position to obtain a high average portfolio yield, but that such a procedure would ordinarily be too hazardous for the small investor, who must seek security of principal before giving attention to yield. When purchasing debentures, the large investment institutions regularly insist on full earnings protection, a practice that is thoroughly justified by the experience record of the debentures that went into default.