Volume Title: The Volume of Corporate Bond Financing Since 1900

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Volume Publisher: PRINCETON UNIVERSITY PRESS, PRINCETON

Volume ISBN: 0-870-14145-7

Volume URL: http://www.nber.org/books/hick53-1

Publication Date: 1953

Chapter Title: CORPORATE BOND DEFAULTS

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Chapter URL: http://www.nber.org/chapters/c3088

Chapter pages in book: (p. 180 - 214)

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CORPORATE BOND DEFAULTS

EARLIER chapters have considered the universe of straight corporate bonds as a more or less homogeneous aggregate; in this chapter we consider the morbidity of that aggregate. The basic annual statistics relating to the volume of defaults on straight corporate bonds are presented in Tables A-17 and A-18, which cover outstandings in default, new defaults, defaulted bonds restored to good standing or extinguished (i.e. "default settlements"), and net changes in outstandings in default.[1] Like the statistics for total funded debt (which include defaulted bonds as well as those in good standing), the several series on defaults form an interrelated set. The difference between new defaults and default settlements is the net change in outstandings in default. The latter series when cumulated generates the amount outstanding in default at the beginning of each calendar year.

In keeping with our general plan of examining only the salient features of corporate funded debt, we consider in the present volume only the broad aggregates relating to corporate bond defaults and their major industry and size breakdowns. Our definitions of the terms "new default" and "default settlement" will indicate the types of situations to be analyzed and their relative importance. After describing the procedures used in constructing the default estimates, we then investigate the secular and cyclical behavior of the various series, the relative importance of new defaults and of default settlements as joint determinants of the net change in outstandings in default, and the rates at which bonds have moved into and out of a state of default. The chapter concludes with a discussion of the period of time required to settle default situations.

[1] Default estimates have not been developed for minor types of issues. To extend our straight bond estimates to cover the minor types, it would suffice for most purposes to add information on serial bond defaults. Equipment obligations have an excellent default record; and income bonds, because of their contingent interest provisions, are not liable to default of interest. Moreover, the majority of the income bonds offered during the period under study had not matured by 1944 and thus were not subject to default of principal.

Summary of Findings

Our data indicate that the aggregate volume of outstanding defaults was relatively unimportant during the first three decades of the century, amounting on the average to less than one-half billion dollars, or 2.75 percent of average outstandings. After 1931 there was an abrupt increase to a peak of slightly over $3.9 billion (14.9 percent of total outstandings) in 1936, followed by a gradual decline to $3.0 billion (13.0 percent) by the close of 1943. This bulge in defaulted bond outstandings during the Great Depression, attributable in the first instance to the increase of new defaults, was accentuated by a lengthening of the period from default to settlement. The latter cause applied especially to rail bonds: although default rates were actually lower on rail bonds than on industrials during 1930-43, industrial defaults were quickly settled whereas rail defaults were not. In consequence the major part of the defaulted outstandings that overhung and depressed the corporate bond market in the late thirties and early forties consisted of rail issues. Although in the thirties defaults on small issues were settled somewhat more rapidly than on large issues, the small issues had otherwise an inferior record.

New defaults and the net changes in outstanding defaults typically decline in periods of generally expanding business activity and rise during business contractions; default settlements, although considerably less sensitive to general business conditions, exhibit rough positive conformity with business cycles. Default situations tend to be settled somewhat faster during expansion than during contraction phases of the cycle, as, of course, would be expected, since settlements are more easily arranged in times of rising than of declining income. Defaulted issues have generally been adjusted more rapidly in the nonregulated industries than in the publicly regulated group; and adjustments have been more rapid for industries having a relatively simple capital structure than for others.

Coverage and Derivation of Default Series

Distress situations on corporate bonds range from minor delays in payment of interest or failure to make payment into a sinking fund to the extreme case in which an entire issue may be adjudged worthless. Therefore it has been necessary to distinguish arbitrarily between default and nondefault situations; and in so doing

we have been neither so liberal nor so narrowly technical as we might have been. A default is defined as (1) a failure to pay interest or principal in the full contractual amount when due, or (2) an exchange or contract modification (of an issue otherwise in good standing) in which the new security received or the modified issue is worth less than par. Sinking fund omissions, which are usually not matters of public record and in most cases are not acted on by the corporate trustee, are not treated here as defaults. On the other hand, any delay in the payment of interest is considered a default even though the duration of the delay may have been within a grace period allowed under the bond indenture. A "default settlement" occurs when a defaulted issue is either restored to good standing or extinguished. When the act of default consists in a "noncontractual" exchange or contract modification, the date of settlement is coincident with the date of default. Exchanges and contract modifications have been defined in Chapter 3; the noncontractual cases are those where the new security or modified issue is worth less than par.

Distribution of Defaults by Nature of Default and Settlement

The relative importance of the various types of defaults and settlements covered by the above definitions may be determined from the distributions of total defaults and settlements of straight bonds presented in Table 19. This table, summarizing default experience for the years 1900-1943 inclusive, is based on Tables A-19 and A-20, which present similar information annually by major industry and size groups. Defaults are here classified by the proximate nature of default. Thus, failure to pay interest, even though followed later by a default of principal, is classified as an interest default. A principal default can occur only at maturity. Simultaneous interest and principal defaults at maturity occur rarely in the case of corporate bonds; when they do, they are grouped with defaults of principal, along with the more usual cases in which interest continues to be paid through maturity. The breakdowns in Table 19 are useful in adjusting the estimates of total defaults and settlements for special types of analyses and in appraising the seriousness of the various types of default situations that have occurred in the past.

Of the total of $77.5 billion par amount of straight corporate

TABLE 19—Percentage Distribution of the Par Amount of New Defaults of Corporate Bonds by Proximate Nature of Default and Settlement, 1900-1943

(DOLLAR FIGURES IN MILLIONS)

		DEFAULTS OF INTEREST[a]					DEFAULTS OF PRINCIPAL[a]				NONCONTRACTUAL EXCHANGES AT DATE OF DEFAULT[b]			
				EXTINGUISHED BY				EXTINGUISHED BY						
	Total defaults	*Total interest defaults*	*Restored to good standing*	*Cash payment*	*Exchange*	*Not settled by 1944*	*Total principal defaults*	*Cash payment*	*Exchange*	*Not settled by 1944*	*Before maturity*	*At maturity*	*Information lacking*	*Total defaults*
All industries	100.0%	65.2%	5.8%	4.7%	36.7%	18.0%	8.3%	0.6%	5.9%	1.8%	15.7%	8.1%	2.7%	$14,915.3
Railroads	100.0	69.9	5.6	1.7	27.5	35.1	8.1	0.5	5.8	1.8	12.1	8.8	1.1	6,708.0
Public utilities	100.0	56.8	7.6	5.7	39.2	4.3	12.3	1.2	8.3	2.8	17.1	9.5	4.3	4,765.1
Industrials	100.0	67.7	4.0	9.0	50.9	3.8	3.1	0.1	2.7	0.3	20.8	4.9	3.5	3,442.2
Large issues	100.0	67.4	5.3	3.0	36.1	23.0	8.5	0.4	5.8	2.3	17.2	5.8	1.1	10,534.1
Small issues	100.0	60.0	7.1	8.6	37.9	6.4	7.8	1.1	6.1	0.6	12.2	13.6	6.4	4,381.2

Based on totals for all years, Tables A-19 and A-20.

[a] Defaults of interest subsequently followed by defaults of principal are here classified as interest defaults. Interest and principal defaults seldom occur simultaneously, but when they do they are classified as defaults of principal, along with the more usual cases in which interest continues to be paid through date of principal default.

[b] Includes contract modifications.

bonds outstanding at any time in the period January 1, 1900 to January 1, 1944, $14.5 billion or 18.7 percent represented issues that had gone to default by January 1, 1944.[2] In addition, bonds totaling $0.4 billion had defaulted a second time—that is, after settlement of an original default of interest—making a total par amount of straight corporate bond defaults of $14.9 billion. Of that total, $6.7 billion (45 percent) represents rail bonds, $4.8 billion (32 percent) utilities, and $3.4 billion (23 percent) industrials. Large issues (issues whose offerings summed to $5 million or more) that defaulted amounted to $10.5 billion (71 percent of total defaults); small issues, $4.4 billion (29 percent). The table shows that for the combined industries 65 percent of total defaults, by the par amount of the issues involved, initially took the form of interest defaults, while only 8 percent represented defaults of principal and 24 percent noncontractual exchanges and contract modifications. The 24 percent breaks down into 8 percent for bonds exchanged or modified at maturity (analogous to principal defaults) and 16 percent for bonds exchanged or modified before maturity (analogous to interest defaults).

The distributions for the various industry and size groups are surprisingly similar. In relation to the total volume of defaults within the industry group, the public utilities had the lowest proportion of bonds defaulting before maturity (interest defaults plus noncontractual exchanges before maturity) while industrials had the highest proportion. This finding, when coupled with the fact that a smaller proportion of utility bonds went to default than of bonds of other industry groups (see Table 22), indicates that the utilities had less difficulty than did industrial obligors in meeting interest payments on their obligations, a conclusion that is consistent with the observed stability of utility as compared with industrial earnings.

The question naturally arises whether interest defaults are of a less serious nature than principal defaults. Some light is thrown on the matter by the classification of interest defaults accord-

[2] Analogous figures for number of issues are approximately 5,000 going to default out of 21,000 outstanding at the beginning of the period or offered subsequently (24 percent). The higher default percentage for number of issues than for par amount is attributable largely to the heavier incidence of default on small issues (see page 208).

ing to nature of settlement in Table 19.[3] For all straight bonds considered, only 9 percent of the par amount of interest defaults (6 percent of total defaults) represented bonds later restored to good standing by payment of back interest, the remaining 91 percent representing situations serious enough that settlement either had not occurred by 1944 or had involved the retirement of the entire issue.[4] Moreover, not all interest-defaulted issues restored to good standing continued in good standing: those that defaulted a second time (totaling $0.4 billion in par amount) made up 44 percent of the 9 percent of interest-defaulted issues whose back interest was repaid. The remaining 56 percent does not necessarily, of course, represent prompt and full settlements. While certain of the interest defaults resulted in only slight loss to investors when the issues were restored to good standing, in other cases back interest was only partially repaid after a long delay and there was no provision for the payment of interest on interest. Yet even if the whole 56 percent—that is, the par amount of all interest-defaulted issues restored to good standing and not again going into default—is eliminated from total defaults, the ratio of defaults to total offerings (including bonds outstanding on January 1, 1900) is reduced only from 18.7 to 18.1 percent. We conclude that interest delays are usually precursors of more serious difficulties, and that to classify even slight delays in the payment of interest as defaults is not unduly stringent.

Exchanges and contract modifications were the most important form of default settlement, 66 percent of total defaults (by par amount of the issues involved) being settled thereby. Interest-defaulted bonds restored to good standing and interest or principal defaults settled by cash payment together account for only 11 percent of the par amount of settlements. The remainder (aside from bonds for which information on nature of default or settlement was lacking, whose total amount was small) represents defaults still not settled by the end of the period studied.

[3] In the classification of defaulted issues by nature of settlement, minority interests were disregarded and all bondholders were assumed to have followed the plan accepted by the majority.

[4] A later volume will analyze bond experience by means of realized yields, which take account of all payments (whether of interest or of principal) on defaulted issues.

Large rail issues accounted for the major part of the amount defaulted and not yet settled by 1944.

Derivation of Estimates

Like the other detailed estimates developed in our study, the default estimates are based on all straight issues of $5 million and over and a 10 percent sample of the smaller issues. It was necessary first to effect a reconciliation of the information available on the default status of the issues included and then to adjust the small sample totals to obtain universe estimates for small bonds.

The Corporate Bond Project data sheets contain, for each defaulted issue included in the samples, information on the dates and amounts outstanding at default and at settlement, and on the amounts outstanding at the beginning of the quadrennial years 1900, 1904, etc.[5] The first step was to check the individual issues to make certain that the recorded amounts were in agreement. In the few cases in which the amounts failed to agree, or where incomplete information was provided, a search of other sources (principally the *Commercial and Financial Chronicle*) was undertaken. Information was obtained, also, on a small number of defaulted issues partially extinguished before the settlement date and on a still smaller number of "offerings" of defaulted issues (usually the release to the public of defaulted bonds previously held under pledge). In a few cases where it was known that an issue was outstanding in default in certain years, but the year of default or of settlement was unknown, it was necessary to infer the dates. Since the manuals generally provide information as of the beginning of the calendar year of publication, we used for the year of default the year just prior to the first published reference stating that the issue was in default, and for the year of settlement the year of the last published reference to the defaulted issue.

[5] The data sheets are described fully in the memoranda mentioned in Appendix B, page 389f. Readers already familiar with them may be interested in the particular records used. Information on dates and amounts of defaults and settlements was taken from the Record of Corporate Bond Defaults, and information on quadrennial outstandings from the Periodic Record of Corporate Bond Experience.

After all materials had been reconciled, the issues were classified annually into six industry-size groups (large rails, small rails, etc.). Within each group the annual estimates of new defaults and of default settlements were then used to generate outstandings in default, by procedures used elsewhere in the study (cf. page 27).

No further adjustment was required for the large issues, but it was necessary to raise the sample figures for small issues to obtain estimates of the total volume of bond defaults. The sample estimates for outstandings in default were adjusted by means of annual raising factors obtained by dividing the par amount of all small bonds outstanding (defaults plus nondefaults) in each industry group by the corresponding par amount in the small bond sample. The adjusted amounts provided the final estimates of outstandings in default, and their first differences gave the final estimates of net changes in defaulted outstandings (for small issues).

It is required that the difference between the final estimates for new defaults and for default settlements equal the estimated net change in outstandings in default. On the assumption that the sample proportions of small-bond outstandings that go to default or are settled within a year hold for the universe of small bonds, we would apply the same raising factors used to obtain outstandings in default against the sample values of new defaults and default settlements. The estimates thus obtained, however, would not be consistent with the estimated net change in outstandings in default unless the raising factors remained constant from one year to the next. Although the annual factors are quite stable, they are not constant, so that a minor adjustment was required to obtain the final estimates for new defaults and settlements.[6] The final estimates for large and small issues are com-

[6] In the following, upper case letters represent our universe estimates for small issues, lower case letters, the sample values, and subscripts, the year. The letters represent the indicated quantities:

O = total outstandings
N = new defaults
S = default settlements
D = outstandings in default

Final estimates for outstandings in default at the beginning of the ith

bined for the industry breakdown in Table A-17 and are presented separately in Table A-18.

Because the raising factors for outstandings were stable, they were used also for obtaining initial estimates for Tables A-19 and A-20 on nature of default and settlement. The annual discrepancies between the estimates of total new defaults obtained in that way and those presented in Tables A-17 and A-18 were then prorated on the basis of the sample classification by nature of default and settlement to make Tables A-19 and A-20 consistent with the basic series.

Defaulted and Nondefaulted Bonds Outstanding

The principal movements of outstanding straight bonds in default will be examined in the subsection below and related to total

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year and for new defaults and default settlements during the ith year were obtained by means of the following formulas:

$$(1) \qquad D_i = R_i d_i$$

$$(2) \qquad N_i = R_{i+1} n_i + (R_{i+1} - R_i) d_i \frac{n_i}{n_i + s_i}$$

$$(3) \qquad S_i = R_{i+1} s_i - (R_{i+1} - R_i) d_i \frac{s_i}{n_i + s_i}$$

where $R_i = O_i/o_i$ is the raising factor appropriate to the beginning of the ith year and $R_{i+1} = O_{i+1}/o_{i+1}$, the factor appropriate to the end of the ith year.

While it is not known that these formulas possess optimal properties in the probability sense, they yield reasonable estimates and consistent ones in the sense that $N_i - S_i = D_{i+1} - D_i$. Subtracting (3) from (2), we obtain

$$\begin{aligned} N_i - S_i &= R_{i+1}(n_i - s_i) + (R_{i+1} - R_i) d_i \\ &= R_{i+1}(d_i + n_i - s_i) - R_i d_i \\ &= D_{i+1} - D_i \end{aligned}$$

which demonstrates that the requirement for consistent estimates is met.

It will be noted that formulas (2) and (3) reduce to the particularly simple forms

$$N_i = R_i n_i \text{ and } S_i = R_i s_i$$

when the raising factors are invariant with respect to time. Since the actual raising factors used were quite stable, the adjustment factors inserted in (2) and (3) (the terms involving $R_{i+1} - R_i$) were quite small. The expression $n_i/(n_i + s_i)$ and its complement $s_i/(n_i + s_i)$ were introduced into the formulas for pragmatic reasons, to reduce the probability of occurrence of negative estimates for N_i and S_i.

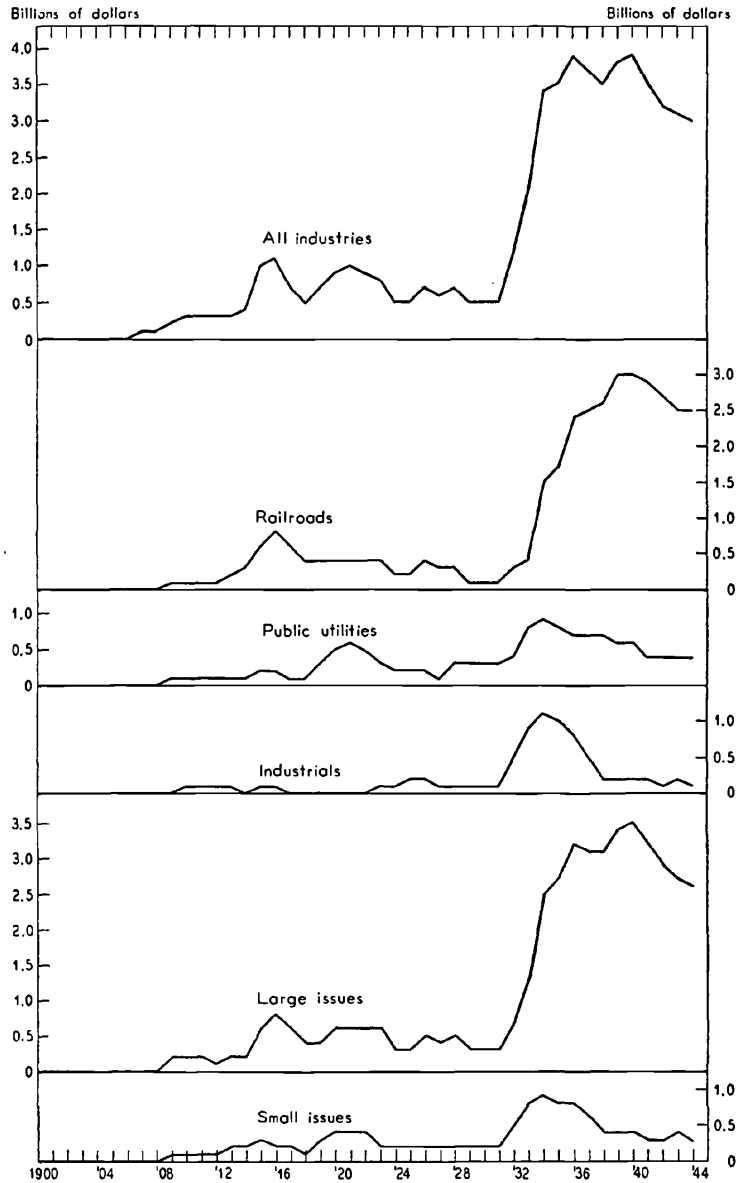
outstandings. Another subsection will deal with estimates for bonds in good standing.

Outstandings in Default

As Charts 22 and 23 make plain, the volume of defaulted bonds of the combined industries, both in absolute and in relative terms, was quite unimportant until 1908 (being under $0.1 billion, or less than 1 percent of total funded debt). From then until 1916, outstandings in default moved upward, with a particularly sharp increase occurring in the contraction year 1914. By 1916 the aggregate volume of defaulted bonds stood just above $1.0 billion, or at 6 percent of total funded debt. Thereafter until the beginning of 1931 the absolute volume fluctuated rather indecisively around an average level of $0.7 billion; but since outstandings were increasing over that period (Chart 2, page 44), the proportion in default fell below 2 percent. The abnormally heavy defaults that followed carried the total par amount of outstandings in default to its absolute maximum of $3.9 billion at the beginning of 1936 (14.9 percent of total funded debt). Small declines in 1936 and 1937 were almost exactly offset by a new wave of defaults in 1938 and 1939; but the total volume of outstandings declined over 1936-39, and the proportion of debt in default continued to rise, reaching a peak of 15.3 percent at the beginning of 1940. Thereafter, default settlements exceeded new defaults, and outstandings in default declined both absolutely and in relation to total funded debt.

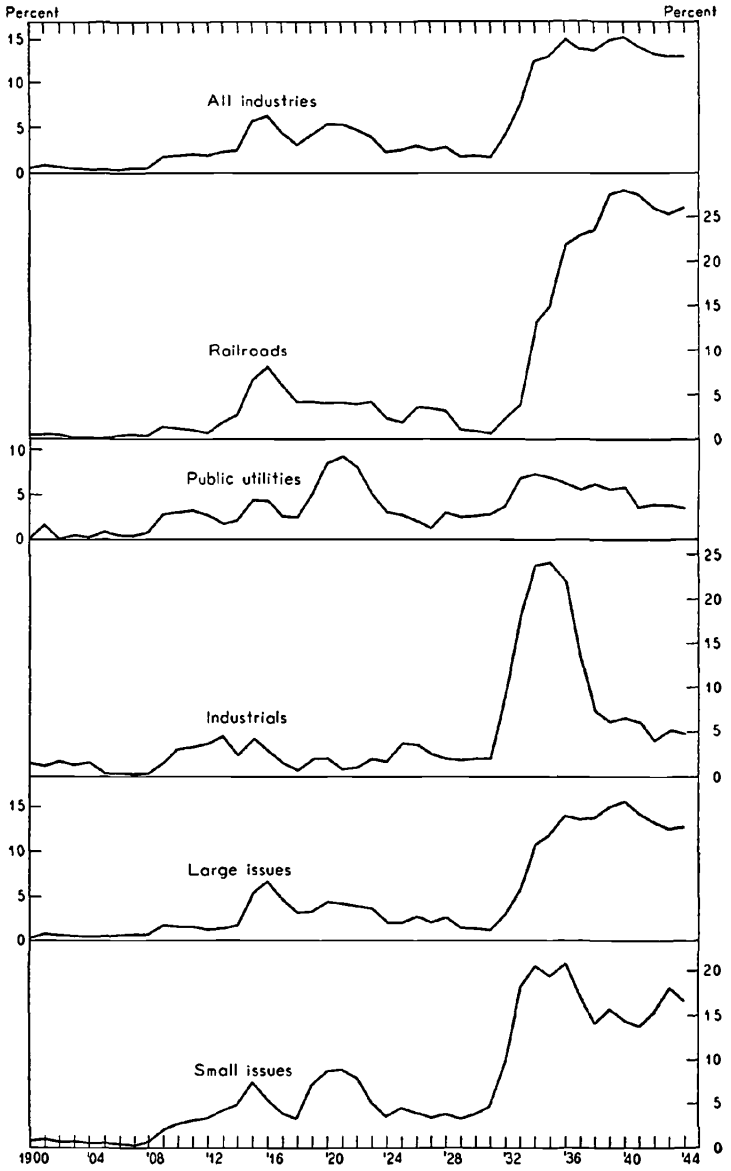
As Chart 24 indicates, railroad defaults were mainly responsible for the dramatic increase in outstandings in default during the Great Depression. In many of the earlier years, too, the railroads were responsible for a large part of the amount outstanding in default; in fact, rail defaults accounted for more than 50 percent of total defaults in 14 of the first 34 years covered by the study and for more than 75 percent in the years 1900, 1907, and 1917. But the comparatively large volume of rail bonds outstanding in default up to 1933 was not excessive considering the total of rail-bond outstandings (Chart 23). Despite a rather poor showing in 1915-17, the average percentage in default calculated through the beginning of 1933 was lower for rails than for either of the other two industry groups. After that, however, the position of the railroads deteriorated rapidly, the proportion of rail

CHART 22—Corporate Bond Outstandings in Default, 1900-1944



From Tables A-17 and A-18; straight bonds, January figures, par amount.

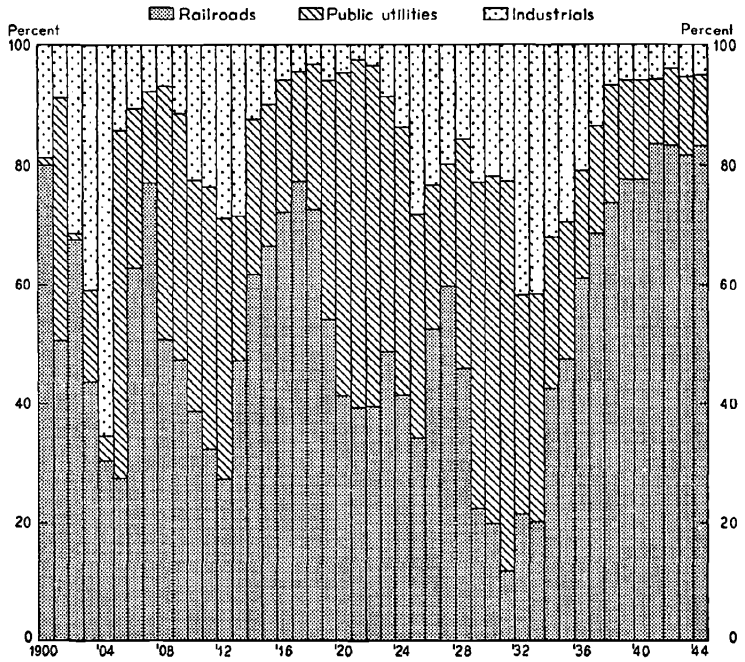
CHART 23—Corporate Bond Outstandings in Default, in Percent of Outstandings, 1900-1944



Based on Tables A-2, A-6, A-17, and A-18; straight bonds, January figures.

outstandings in default climbing from 3.8 percent at the beginning of 1933 to a peak of 27.9 percent at the beginning of 1940. (The considerable lag in settling rail defaults in these years, which was largely responsible for the increasing proportion of outstandings defaults, will be discussed on page 200.) The sub-

CHART 24—Percentage Distributions of Corporate Bond Outstandings in Default, by Major Industry Group, 1900-1944



Based on Table A-17; straight bonds, January figures.

sequent decline in rail bonds outstanding in default, although appreciable in absolute amount, was quite small in relation to rail debt outstanding, especially when compared with the declines occurring in the other two industry groups.

The largest proportion of utility-bond outstandings in default occurred in the period 1919-23, the peak of 9.1 percent being recorded in 1921. But most of these defaults were quickly settled, and the proportion fell to a low of 1.2 percent in 1927. During

the financial collapse of the thirties, utility defaults did not rise above 7.1 percent of outstandings (1934) and by 1944 had declined to 3.5 percent. In the period of heavy utility defaults after World War I approximately eight-tenths of the total amount represented bonds of street railways, and in the thirties from a half to two-thirds.[7] Thus it appears that utilities other than street railways had an excellent record.

The record of industrial defaults is somewhat more checkered than that of the utilities but is better in most respects than that of the rails. Industrial outstandings in default rose sharply from $0.1 billion in 1931 to $1.1 billion in 1934 (or from 2.0 to 23.8 percent of industrial outstandings). The subsequent fall, however, was equally abrupt, so that by 1944, as in 1931, only $0.1 billion (this time 4.8 percent of outstandings) was in default.

The data show that, over and above the obvious effects of the business cycle, secular trends in industry have a direct influence on corporate bond defaults. Because of truck and bus competition the rails have been in a poor position trafficwise since the twenties, and street railways have been a declining industry since World War I. Therefore it is not surprising that defaults were particularly heavy in those fields. On the other hand, defaults were lightest among bonds of the electric utilities, largely because such companies have enjoyed a very rapid rate of secular growth since 1900, even more rapid than that of the manufacturing industries.

One of the most persistent relationships observed in the data is the relatively high ratio of defaults to outstandings for small as compared with large issues. To be sure, small issues are offered in many cases by large concerns; nevertheless a question is posed as to whether small business units have a poorer record than large ones. Although the question cannot be examined fully within the scope of this report, it will be dealt with in later monographs.[8]

[7] Separate statistics on street railway defaults and on defaults in other minor industry groups will be presented in a later monograph.

[8] Some material bearing on the question of size and risk (default and loss rates on bonds in different asset size classifications) will be presented in a later volume. A more detailed investigation of the funded debt experience of small- and medium-sized industrial obligors is being undertaken by Elizabeth T. Simpson.

Outstandings in Good Standing

The material developed on outstandings of defaulted bonds has been used in conjunction with the data on total outstandings in Tables A-2 and A-6 to obtain estimates for nondefaulted bonds. The resulting estimates, covering straight bonds, are presented in Table A-21. Since virtually all institutional investors and personal trust accounts are prohibited either by statute, by regulatory authority, or by custom from purchasing bonds in default, the estimates for nondefaulted bonds approximate closely the upper limit of investment outlets available to those groups.

Until 1914 practically all bonds were in good standing: 98 percent of total outstandings or better. The proportion fell rapidly in the following two years to a low of 94 percent, and then rose gradually until it again stood at 98 percent during the period 1927-31. The peak amount for absolute volume of straight bonds in good standing ($28.1 billion) is recorded at the beginning of 1931, although total outstandings did not reach their peak until one year later ($29.0 billion). Both total outstandings and the volume in good standing fell in the late thirties and early forties; by January 1, 1944 nondefaulted bonds amounted to only $19.8 billion, or 87 percent of the total.

The pronounced shrinkage in the volume of investment outlets available to the investment intermediaries after 1931 is indicated by the fact that by 1944 the total volume of straight bonds in good standing was no larger than it had been two decades earlier (1923). Owing partly to the heavy volume of rail defaults and partly to the contraction in rail debt, the shrinkage in the volume of rail bonds in good standing was especially pronounced, the par amount outstanding at the beginning of 1944 being just above the amount outstanding on January 1, 1906. The shrinkages in the utility and industrial fields were somewhat less marked, the volume of bonds in the former group standing in 1944 at about its 1928 level and in the latter group at its 1921 level. For these two industry groups the decline in the total volume of funded debt outstanding largely explains the shrinkage.

New Defaults, Default Settlements, and Net Changes in Outstandings in Default

The annual estimates of the volume of new defaults and of default settlements from Tables A-17 and A-18 are presented in Chart 25.

The difference between these estimates is the net change in outstandings in default, indicated in the chart as a white area if positive and as a shaded area if negative.

An analogy may be drawn between total offerings and new defaults and also between total extinguishments and default settlements, the former pair of series measuring gross inflows into their respective stocks of outstandings, and the latter, gross outflows from their stocks. Like the estimates for total offerings and extinguishments, the default series are of the gross type (cf. page 65). As has been mentioned, new defaults and default settlements cover (1) certain exchanges and contract modifications for which the dates of default and settlement coincide, and (2) interest and principal defaults for which the dates of settlement lag behind the dates of default. The overlapping exchanges and contract modifications can be eliminated from both series without affecting the estimates of the net change in outstandings in default, but since their amounts are relatively small, they are included in most of the analysis that follows.

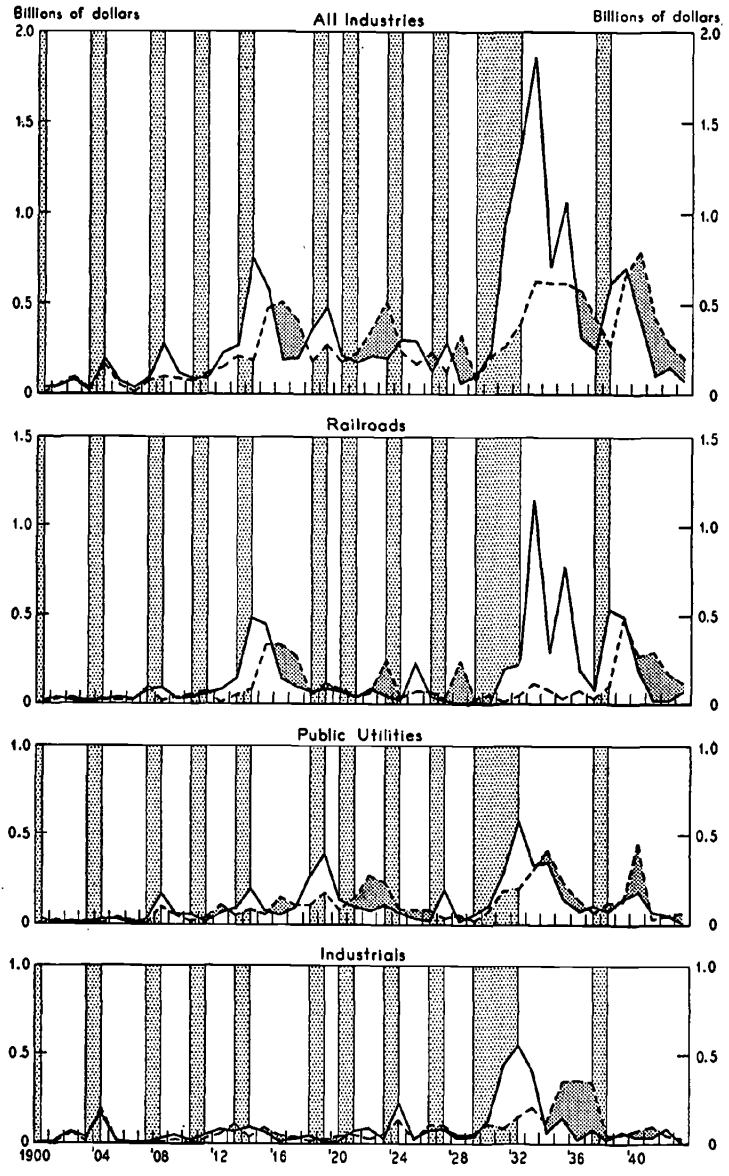
Secular and Cyclical Behavior of the Series

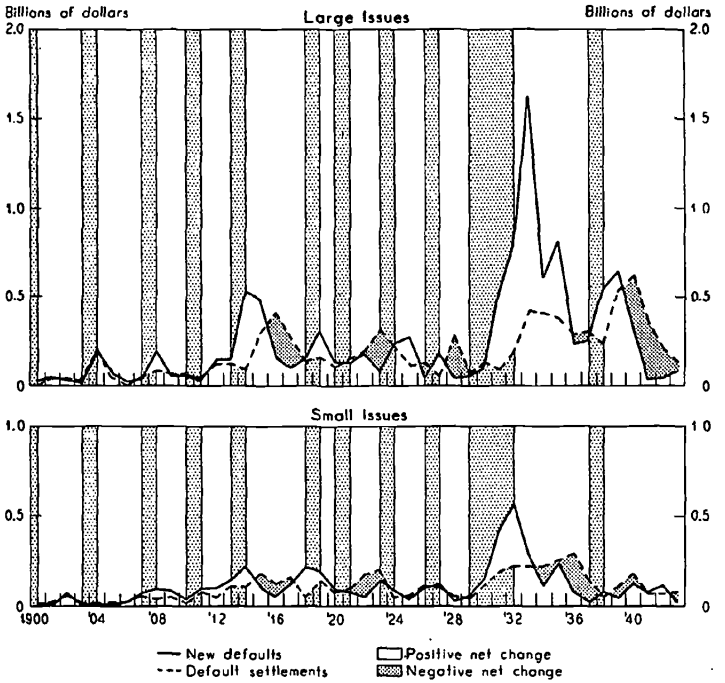
The general impression obtained from Chart 25 is one of pronounced cyclical variation in new defaults, with the series reaching peaks at or near trough years in general business activity and troughs at or near peak years. Default settlements, on the other hand, show less sensitivity to the changing pace of business activity and a lower amplitude of variation.

For the combined industries, successive waves of new defaults reached crests in 1904, 1908, 1914, 1919, 1924, 1927, 1933, and 1939, the first six coinciding with trough years in general business activity and the last two lagging by one year. The fact that 1921 does not turn up in this list is quite striking; a possible explanation is that the railroads, which were in difficulty at that time, were supplied funds by the federal government. The years 1914-15, 1919, 1931-35, and 1938-39 stand out as periods of unusually heavy defaults. The railroads accounted for a major share of new defaults in most of these periods, namely in 1914-15, 1933, 1935, and 1938-39. The utilities were the worst offenders in 1919, 1932, and 1934. Industrial defaults were unusually heavy in 1931-33.

While rail bonds accounted for a substantial portion of the par

CHART 25—New Defaults, Default Settlements, and Net Changes in Corporate Bond Outstandings in Default, 1900-1943





From Tables A-17 and A-18; straight bonds, yearly totals, par amount.

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.

amount of new defaults in the thirties, they were the slowest to go to default, the period of heaviest defaults beginning in 1931 for industrials, in 1932 for utilities, and in 1933 for rails. And while the records of the other two industry groups were quite good after 1934, substantial volumes of rail bonds went to default in 1935 and again in 1938-39. In general the default experience of large issues paralleled that of the rails, since many of the large issues were rail issues. The heaviest defaults on small issues occurred in 1931-32 and were almost entirely in the nonrail groups.[9]

[9] Our data show that new defaults on small issues led peaks in new

Whereas new defaults are dominated by general business conditions and exhibit marked contracyclical swings, default settlements are influenced by a greater variety of factors and show less pronounced cyclical variation. The relative insensitivity of default settlements to business cycles is the outcome of an averaging process brought about by variations in the length of time required to adjust distress situations. If this time interval were identical for each of the issues going to default, the series for default settlements would simply be a replica of the series for new defaults, lagged a given number of years. On the other hand, if the new defaults of each year were always settled uniformly over a given number of years, the annual series for settlements would be a simple moving average of new defaults. For example, if bonds totaling one-tenth of the par amount of new defaults in each year were always settled in the first year following default, one-tenth in the second, and so on up to the tenth year, the settlement series would be a moving average of new defaults with an average lag of five years (one-half the reciprocal of the proportion settled within each year).

The actual behavior of default settlements is intermediate between the two extremes; the settlements series is neither an exact replica nor a simple moving average of new defaults. Rather it is a complex average within which there is considerable shifting of the weights from one year to the next. In some years new defaults are quickly settled, particularly when a large proportion of the par amount of bonds going to default represents cases in which the act of default is a noncontractual exchange or contract modification (that is, when the settlement is coincident with the default). But when defaults are mainly on interest or principal,

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defaults on large issues 5 times and coincided 4 times out of 9 comparisons. This finding is particularly interesting since other National Bureau studies show that *failures* of small firms tend to lag behind those of large firms. In the case of corporate bonds, part of the timing difference is caused by the fact that nonrail defaults typically lead rail defaults and that the proportion of rail issues in large issues is greater than in small issues (in 9 comparisons, industrial defaults led rail defaults at 5 specific peaks, coincided 3 times, and lagged once). A size breakdown of defaults by industry group gives further evidence of the tendency for defaults on small issues to lead those on large issues. Out of a total of 22 possible comparisons within the three industry subgroups, small issues led the large at peaks 9 times, coincided 11 times, and lagged twice.

the periods of settlement may range from a few days to many years.

If all defaults were settled by noncontractual exchange or contract modification, the correlation coefficient between current new defaults and settlements would be +1.00, since defaults and settlements would coincide. Because some part of the amount of new defaults is usually made up of such exchanges and modifications, we must expect a positive correlation between the two series. Thus 24 percent of the par amount of total new defaults for the period 1900-1943 consisted of defaults immediately settled by noncontractual exchange or contract modification (Table 19), and some other defaults were settled after a very brief delay. As expected, the correlation coefficients for concurrent new defaults and settlements are positive but low (+0.55 for the combined industries, +0.25 for rails, +0.61 for utilities, and +0.39 for industrials; see Table 21). It is noteworthy that the coefficient is lowest for the railroad group, where noncontractual exchanges constituted the smallest proportion of the total par amount of defaults, and is higher for the public utilities and industrials, where such exchanges represented a larger part of defaults. Since settlements do not systematically lag behind defaults of interest and principal, the correlation does not improve uniformly for the various industry groups when default settlements are predated to allow for a hypothetical one-year lag. In that case the coefficients rise to +0.74 for the combined industries and to +0.40 for rails but fall to +0.56 for utilities and to +0.29 for industrials. The difference in industry behavior is largely explained by the fact that for the utility and industrial groups, settlements on date of default were larger in comparison with the total amount of their defaults, and settlements of interest and principal defaults were more rapid, than for rails. In general the results are not significantly improved by allowing for longer lags.

There appears to have been a pronounced tendency, before the Great Depression, for default settlements to lag new defaults by fairly short intervals. That tendency continued in the industrial field, where heavy settlements in 1935-37 followed the heavy defaults of 1931-33. Thus the volume of industrial outstandings in default at the beginning of 1938 was only slightly above the volume at the beginning of 1931 (Chart 22). Likewise

in the public utility field settlements followed shortly after new defaults in the thirties. Default settlements for utilities reached peaks in 1934 and 1940 and were rather consistently above new defaults during the middle and late thirties. The depression experience of the railroads was unique in the matter of settlements as well as in that of defaults, for settlements showed no pronounced tendency to rise until 1939.[10] In fact, for the rail group from 1931 through 1939 new defaults exceeded settlements in every year. This explains a development already observed: that rail outstandings in default climbed from 3.8 percent of total rail outstandings at the beginning of 1933 to a peak of 27.9 percent at the beginning of 1940. It was not until the period of improved rail earnings ushered in by World War II that rail settlements rose above new defaults and the volume of defaulted outstandings began to decline.

The relationships of the various default series to the business cycle, shown graphically in Chart 25, are expressed numerically in the conformity indexes of Table 20. As the table indicates, new defaults exhibit inverse conformity with business cycles. The full-cycle indexes, except those for rail bonds and small issues, are quite high, indicating that the volume of new defaults typically rises more rapidly in contraction phases (or falls less rapidly) than in preceding and succeeding expansion phases. The generally negative pattern of the expansion and contraction indexes indicates, further, that new defaults tend to rise in contraction and to fall in expansion phases. The indexes for default settlements, on the other hand, suggest negligible cyclical conformity, the full-cycle indexes having low negative values for the major industry groups and low positive values for the two size groups. Accordingly it might be expected that the net changes in outstandings in default (that is, the differences between total new defaults and default settlements) would exhibit somewhat lower negative conformity than do new de-

[10] The experience of the railroads during the Great Depression was unique not only as compared with that of other industry groups but also when compared with their own experience in earlier years. As will be shown in the discussion beginning on page 210, rail defaults were rather quickly settled in the period 1900-1929; moreover, an examination of the twenty-five largest railroad receiverships in the 1880's and 1890's indicates that the period between the appointment of a receiver and the reorganization of the road was then only about two years.

TABLE 20—Conformity Indexes for Selected Series on Corporate Bond Defaults and Default Settlements: Ten Reference Cycles 1900-1938

	Expansion	*Contraction*	*Full cycle*
		New defaults	
All industries	−60	−80	−79
Railroads	0	−40	−5
Public utilities	−40	−20	−58
Industrials	−60	−60	−79
Large issues	−80	−60	−89
Small issues	0	−40	−37
		Default settlements	
All industries	−20	−20	−5
Railroads	+20	−20	−5
Public utilities	−20	−20	−16
Industrials	0	−10	−16
Large issues	+20	0	+5
Small issues	0	+20	+5
		Net changes	
All industries	−60	−60	−89
Railroads	−20	−20	−47
Public utilities	−40	−40	−68
Industrials	−60	−60	−58
Large issues	−80	−60	−79
Small issues	−40	−40	−47
	Noncontractual exchanges on date of default		
All industries	+10	−20	−37
Railroads	0	−30	0
Public utilities	−30	−30	−5
Industrials	+10	−30	−26
Large issues	−10	−20	−16
Small issues	−10	−10	−11
	Defaults of interest and principal		
All industries	−60	−60	−79
Railroads	−40	−50	−47
Public utilities	−60	−40	−79
Industrials	−30	−40	−58
Large issues	−60	−40	−79
Small issues	−40	−20	−47
	Settlements of interest and principal defaults		
All industries	+40	0	+16
Railroads	+20	0	+16
Public utilities	−40	−40	−37
Industrials	+40	+10	+26
Large issues	+20	0	+16
Small issues	0	−20	+5

Based on annual data, Tables A-17 to A-20. These indexes do not take account of possible leads or lags at reference-cycle turning points.

faults. Actually, however, the net-change series often exhibit slightly higher negative conformity than the new-defaults series. (Note particularly the full-cycle indexes for rails and for small issues: net-change indexes have a higher negative value than the corresponding new-default indexes.)

A clue to an understanding of the rather anomalous behavior of the net-change series may be found in an examination of the component series entering into total defaults and settlements. It will be recalled that certain noncontractual exchanges and contract modifications enter equally into both series, since they are settled on date of default. The conformity indexes for these coincident defaults and settlements (referred to in the table as noncontractual exchanges) are predominantly negative, but have smaller negative values than do the series on total new defaults.[11] When the noncontractual exchanges are subtracted from the total of new defaults, we obtain series for defaults of interest and principal, which exhibit high negative conformity, as is usually to be expected when a series with positive or low negative conformity is subtracted from one having high negative conformity. Settlements of interest and principal defaults are obtained analogously by subtracting noncontractual exchanges from total default settlements. None of the full-cycle indexes for settlements of interest and principal defaults is large, but all of them except that for public utilities are positive. Thus the generally positive pattern of these indexes lends limited support to the view that it is easier to effect reorganizations and settle default situations when earnings are expanding than when they are contracting.[12]

Since noncontractual exchanges and contract modifications cancel out of both components of the net change in outstandings in default, the latter series may be interpreted as the difference between interest and principal defaults and the settle-

[11] The lower negative conformity of noncontractual exchanges as compared with total new defaults is not surprising in view of the rather small volume of exchanges occurring in any year and their extreme lumpiness with respect to size. In addition, certain noncontractual exchanges and contract modifications on issues not otherwise in default occur on date of reorganization of the obligor, and these behave like settlements rather than new defaults.

[12] "Settlement rates" on total defaults and on interest and principal defaults also exhibit low conformity. See page 214.

ments of such defaults. Thus interpreted, it appears as the difference between one series with high negative conformity (interest and principal defaults) and another with low positive conformity (settlements of interest and principal defaults). A fortiori, the difference—the net change in outstanding defaults—exhibits pronounced negative conformity with cycles in general business activity, and in certain series the negative conformity is even more pronounced than for total new defaults.

An insight into the timing relationships between the default series is provided by an examination of average rank patterns for all industries based on annual data (Chart 26; for the method of deriving such patterns, see Chapter 4). As the chart shows, all series except settlements of interest and principal defaults move inversely to the business cycle. Net changes in outstandings in default, new defaults, and interest and principal defaults all exhibit clear-cut v to IX conformity; that is, they typically expand during business contractions (cycle stages v-IX) and contract during business expansions (stages I-v). Total default settlements, which are a mixture of noncontractual exchanges and settlements of interest and principal defaults, expand over stages v-III; and the conformity indexes, when computed accordingly, rise to -20, -80, -26 (see Table 20 for the indexes on a v-IX basis). When the noncontractual exchanges are removed from total default settlements to obtain settlements of interest and principal defaults, the pattern takes on a more nearly positive shape. Settlements of interest and principal defaults typically expand over cycle stages VII-III, with a pronounced rise during the first half of expansions. When account is taken of the tendency of this series to lead turning points in the reference cycle, the conformity indexes rise markedly to +45, +40, +70.

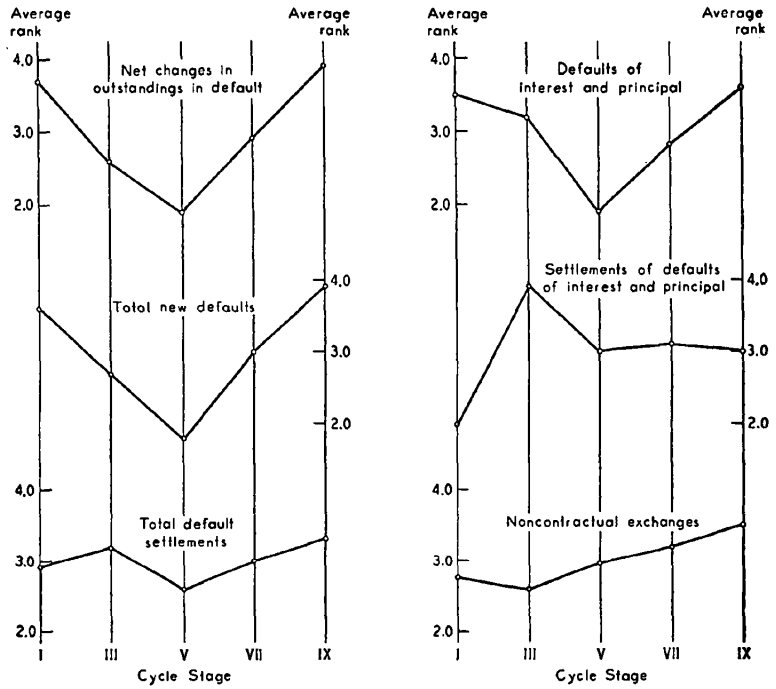
Influence of New Defaults and Default Settlements on Net Changes in Outstandings in Default

The procedures employed in Chapters 2 and 3 to analyze the influence of offerings and extinguishments on the net change in total outstandings may be applied here to determine the contributions of new defaults and settlements to the net change in outstandings in default. The analysis will be conducted in terms of total new defaults and settlements; but because of the rela-

tively small volume of noncontractual exchanges settled on date of default, the conclusions would not be modified greatly if derived solely from interest and principal defaults.

It has been demonstrated that when a series is obtained as the difference between two series—one with high and one with

CHART 26—Average Annual Rank Patterns for Selected Corporate Bond Default Series during Cycles in General Business Activity, 1900-1938



Based on annual data, from Tables A-17 and A-19, for straight bonds.

low variability—the series with the higher variability dominates the resultant series unequivocally, provided the component series are uncorrelated. The influence of each component on the resultant is reduced somewhat if the component series are positively correlated and is amplified if the series are negatively correlated. On the other hand, the effect of intercorrelation may be neglected when one series has very high variability in comparison with the

other.[18] These principles may be applied to the default estimates, the net change in outstandings in default being the resultant series and new defaults and default settlements its components.

The railroad estimates are the prototype of a set of series in which one component (new defaults), by virtue of its high variability, dominates the resultant (the net change in outstandings in default). As Table 21 indicates, the variance of new rail defaults is over four and one-third times that of rail settlements, and the correlation between the two series is low and not significantly different from zero (+0.25). In consequence, the

TABLE 21—Correlation Coefficients and Variance Ratios for New Defaults, Default Settlements, and Net Changes in Corporate Bond Outstandings in Default, 1900-1943

	All industries	*Railroads*	*Public utilities*	*Industrials*
Correlation coefficients				
New defaults and default settlements	+0.55[a]	+0.25	+0.61[a]	+0.39[a]
New defaults and net changes in default outstandings	+0.85[a]	+0.88[b]	+0.59[a]	+0.71[a]
Default settlements and net changes in default outstandings	+0.03	−0.23	−0.28	−0.38[a]
Ratios of variances[b]				
New defaults to default settlements	3.57[c]	4.37[c]	1.42	1.71

Based on annual data, Table A-17.

[a] A coefficient of this size or larger would be obtained by chance in less than 5 out of 100 trials if drawn from a population in which the variables are uncorrelated.

[b] For a discussion of the variance and variance ratio see Chapter 2, footnote 14 and the concluding statistical note.

[c] A variance ratio of this size or larger would be obtained by chance in less than 5 out of 100 trials if drawn from a population in which the variables have equal variances.

correlation between new defaults and the net change is high while that between default settlements and the net change is low. Since the component series are virtually uncorrelated in the sample, the sample variance of the net change is approxi-

[18] See the statistical demonstration ending Chapter 2.

mately equal to the sum of the variances of new defaults and settlements. Thus, about 80 percent (4.37/5.37) of the variance in the net change in outstandings in default is attributable to new defaults and the remainder to default settlements.

Since rail defaults account for such a large proportion of total defaults, the relationship between new defaults and net changes is essentially the same for the combined industries as it is for the rails. Despite the fact that new defaults and default settlements show significant positive correlation in this case (+0.55), the very high variance ratio between new defaults and settlements (3.57) makes the correlation between new defaults and net changes highly significant (+0.85) while that between settlements and net changes is negligible. Again we have a situation in which new defaults, by virtue of their greater variability, dominate the year-to-year movements in outstandings.[14]

Because defaults were settled more quickly for public utility and industrial bonds than for rails, the variance ratios for utilities and industrials are much lower and the correlation coefficients between new defaults and settlements are significantly different from zero. It follows that in those industries new defaults had comparatively less influence on the net changes, as the lower correlation coefficients show. On the other hand, there is a slightly higher negative correlation between settlements and the net changes, and for industrials the coefficient is significant.

Because of the close association between new defaults and the net changes for rails, the turning points of the specific cycles in the two series usually occur in the same year. The same is true for the combined industries, but no such systematic relationship is observable for utilities and industrials. On the other hand, since the par amount of outstandings in default is obtained by cumulating the net changes, it continues to rise so long as the net changes are positive and falls only when the net changes turn negative. In contrast with the net changes in total outstandings (cf. page 61), the default net changes alternate between positive and negative values, and outstandings in de-

[14] It will be recalled from Chapter 3 that an analogous situation holds for the net-change series in total outstandings, where the annual variations may be ascribed mainly to the component new-money offerings rather than to repayments.

fault exhibit specific cycles with turning points lagging those in default net changes (and for rails and the combined industries, lagging turning points in new defaults).[15] As has been indicated, settlements also usually lag new defaults at turning points.

Default and Settlement Rates

The risk of default on corporate bond investments may be measured through default rates obtained by relating the absolute amount of new defaults to the aggregate volume of securities "eligible" for default (i.e. the volume of bonds in good standing). Settlement rates, obtained by relating the absolute amount of settlements to the aggregate volume of securities eligible for settlement (i.e. the volume of bonds in default), provide information on the speed of settlement.

Default Rates

So far as short-run movements in default rates are concerned, very little needs to be added to what has already been said about new defaults. Since the volume in good standing (the base on which the rate is computed) forms a smooth series relative to new defaults, default rates almost always move over the short run in the same direction as new defaults; in fact, their annual peaks and troughs can be located accurately from the graph of new defaults (Chart 25). Moreover, the several indexes of cyclical conformity of default rates are identical with those given in Table 20 for new defaults, with the single exception of the full-cycle index for industrials. The latter changes, however, only from -79 for new defaults to -68 for default rates, the smallest change possible in a full-cycle index for a series covering ten reference cycles.[16] Thus default rates, like new defaults, exhibit high negative conformity with business cycles.

Estimates of long-period levels of default rates were obtained by averaging the annual rates over selected periods and are

[15] Compare, for example, peaks in new defaults for the combined industries (Table A-17) in 1914, 1919, and 1933 with corresponding peaks in defaulted outstandings in 1916, 1921, and 1936; and troughs in new defaults in 1916, 1921, 1926, 1928, and 1937 with corresponding troughs in defaulted outstandings in 1918, 1924, 1927, 1929, and 1938.

[16] A conformity index of —79 for a series covering ten reference cycles indicates 17 inverse movements out of 19 comparisons; an index of —68 indicates 16 inverse movements out of 19.

presented in Table 22.[17] The table indicates that despite the large absolute volume of rail defaults during the period 1900-1943, the average annual default rate for rails was just slightly above that for utilities (the difference is not significant) but was significantly below that for industrials. Large issues, a substantial proportion of which were rail issues, also had significantly lower average default rates than small issues.[18]

TABLE 22—Average Annual Default Rates for Corporate Bonds, and Their Variances, 1900-1943

PERIOD	*All industries*	*Railroads*	*Public utilities*	*Industrials*	*Large issues*	*Small issues*
			Average default rate (percent)			
1900-1943	1.7	1.7	1.6	2.6	1.5	2.6
1900-1929	1.3	0.9	1.5	2.1	1.1	1.7
1930-1943	2.6	3.2	1.6	3.5	2.2	4.5
1900-1909	0.9	0.4	1.1	2.9	0.9	0.9
1910-1919	2.0	1.8	2.4	1.8	1.7	2.8
1920-1929	1.0	0.6	1.1	1.6	0.8	1.5
1930-1939	3.2	4.1	1.9	4.4	2.9	4.9
1940-1943	0.9	1.0	0.7	1.3	0.6	3.7
			Variance (percent)[a]			
1900-1943	2.2	5.6	2.4	9.6	2.2	6.8
1900-1929	1.0	1.6	2.7	7.4	1.2	1.9
1930-1943	3.9	10.8	1.8	13.8	3.7	12.5

Based on annual data, Tables A-17, A-18, and A-21.

[a] Owing to the extreme non-normality of the distribution of default rates, the variances presented here should not be used in standard tests of the difference between means. They are useful, however, as measures of dispersion.

[17] Estimates of long-period default rates may, of course, be computed in other ways than by averaging the annual rates, for example by striking a ratio of the average amount of new defaults over the period to the average of outstandings in good standing, or to the average of total outstandings. Rates were computed on these bases as a check on the results of Table 22. They generally agreed closely in level with the rates presented here and always agreed in rank.

[18] The standard large-sample test for the difference between means makes use of the fact that the means of large samples are normally distributed. Since the annual default rates have a highly skewed distribution, and since the sample contains only 44 items, the applicability of the large-sample test might be questionable. The default rates were therefore "normalized" by means of a cube-root transformation before the above-mentioned differences were tested for significance.

In addition to the size of the default rate, another important consideration to investors is its stability; other things being equal, it is easier to build up an adequate reserve for default losses when default risk is steady than when it is not.[19] It is interesting to note in this connection that the most stable default rates over the period 1900-1943 prevailed on utility and large issues, and the greatest instability on industrials; small issues and rails occupied intermediate positions.

Default rates up to 1930 are of particular interest as reflecting the factual bases for conservative investment opinion before the Great Depression. During the period 1900-1929 default rates were lower on the average for the rails than for the other industry groups and were more stable. Rail bonds, accordingly, were favored as outlets for the funds of personal trusts and investment intermediaries. The sharp rise in rail default rates in the thirties was shocking at the time, but was later to prove less serious than the long period of time required to effect rail reorganizations and to settle rail defaults, which will appear when settlement rates are considered. Actually, as the data of Table 22 indicate, rail bonds had lower default rates than industrials in the thirties, and in fact in all decades covered by our records except that spanning World War I, when the two groups had the same average rate. Moreover, rail default rates had a slightly lower variance in the thirties than industrial rates. But the heavy defaults on industrial bonds were more quickly settled and perhaps for that reason attracted less public attention.

The earlier conclusion as to the superior default record of large as against small issues, which was based on the ratio of defaulted outstandings to total outstandings, is supported by the average default rates of Table 22. Default rates on the large issues were lower than those on small issues in all periods except the decade 1900-1909, when both groups had the same average rate. The variance of default rates was also lower for large than for small issues, especially in the period 1930-43. Thus, default rates of large issues fluctuated less about a lower average rate.

[19] The question of the actual reserves required to offset default losses on various groups of securities will be treated in a later monograph.

Settlement Rates and the Interval between Default and Settlement

Default rates measure the relative flow per unit interval of time of bonds in good standing into the "stock" of defaulted bonds, and settlement rates, the relative flow out of this stock. While settlement rates are thus analogous to default rates, an additional problem arises in their construction owing to the fact that substantial amounts of new defaults are usually settled within the year of default. It follows that the group of bonds "eligible" for settlement within a given year is not simply the amount in default at the beginning of the year but that amount plus the amount going to default during the year. Ratios of the total volumes of default settlements to the corresponding amounts eligible for settlement were computed on an annual basis, and their averages over selected periods are presented in Table 23. Table 24 presents similar average settlement rates for defaults of

TABLE 23—Average Annual Settlement Rates on Total Corporate Bond Defaults, and Implied Length of Time from Default to Settlement, 1900-1943

PERIOD	*All industries*	*Railroads*	*Public utilities*	*Industrials*	*Large issues*	*Small issues*
	Average settlement rate (percent)					
1900-1943	27.1	21.7	27.7	33.0	26.2	28.5
1900-1929	33.2	28.0	30.9	35.8	32.9	31.4
1930-1943	14.1	8.4	20.9	27.0	11.9	22.4
1930-1939	15.4	8.8	20.7	27.2	12.8	23.2
Contraction and trough years	24.8	17.3	19.3	31.9	23.5	21.2
Expansion and peak years	28.1	23.6	31.2	33.5	27.3	31.6
	Implied period from default to settlement (years)					
1900-1943	3.7	4.6	3.6	3.0	3.8	3.5
1900-1929	3.0	3.6	3.2	2.8	3.0	3.2
1930-1943	7.1	11.9	4.8	3.7	8.4	4.5
1930-1939	6.5	11.4	4.8	3.7	7.8	4.3
Contraction and trough years	4.0	5.8	5.2	3.1	4.3	4.7
Expansion and peak years	3.6	4.2	3.2	3.0	3.7	3.2

Based on annual data, Tables A-17 and A-18. The settlement rate used here is defined in footnote 20.

interest and principal.[20] The latter table is the more meaningful of the two, since the problem of the speed of settlement of defaulted bonds is encountered only with interest and principal defaults, others being settled on date of default.

TABLE 24—Average Annual Settlement Rates on Corporate Bond Defaults of Interest and of Principal, and Implied Length of Time from Default to Settlement, 1900-1943

PERIOD	*All industries*	*Railroads*	*Public utilities*	*Industrials*	*Large issues*	*Small issues*
			Average settlement rate (percent)			
1900-1943	19.4	15.2	22.7	24.2	20.0	19.9
1900-1929	23.5	19.3	26.0	25.1	25.2	20.7
1930-1943	10.7	6.4	15.7	22.3	8.8	18.2
1930-1939	11.3	6.3	14.7	23.9	9.0	19.5
Contraction and trough years	15.5	10.0	14.3	24.4	16.4	13.5
Expansion and peak years	21.1	17.4	26.2	24.2	21.5	22.6
			Implied period from default to settlement (years)			
1900-1943	5.2	6.6	4.4	4.1	5.0	5.0
1900-1929	4.3	5.2	3.8	4.0	4.0	4.8
1930-1943	9.3	15.6	6.4	4.5	11.4	5.5
1930-1939	8.8	15.9	6.8	4.2	11.1	5.1
Contraction and trough years	6.5	10.0	7.0	4.1	6.1	7.4
Expansion and peak years	4.7	5.7	3.8	4.1	4.7	4.4

Based on annual data, Tables A-17 through A-20. The settlement rate used here is defined in footnote 20.

It will be recalled that turnover rates on total outstandings were used in Chapter 2 to approximate the length of life of corporate bonds. When averaged over fairly long periods, settlement rates may be used similarly to obtain rough approximations to the interval from default to settlement, although in the short run annual settlement rates are highly unstable and of little significance, owing to extreme fluctuations in the annual volume

[20] Let E equal noncontractual exchanges and contract modifications settled on date of default; N, total new defaults; S, default settlements; and D, outstandings in default, beginning of calendar year. Then the settlement rate for total defaults (Table 23) is defined as $S/(D+N)$, and the rate for interest and principal defaults (Table 24) as $(S-E)/(D+N-E)$.

of defaults and settlements. On the average, the lower the settlement rate, the longer the time that ensues between dates of default and settlement; hence the reciprocals of the average settlement rates computed over fairly long periods may be used to rank the various industry and size groups by length of time required to settle default situations. A better method, of course, would be to determine the mean interval from default to settlement from information on individual issues; but the mean cannot be computed until all defaults within a given period have been settled. Nevertheless a few long-period medians have been computed for the large issues, and in general they substantiate the conclusions drawn from the reciprocals of the average settlement rates.[21]

For the entire period covered by our study, settlement rates for interest and principal defaults averaged 19.4 percent, which suggests an "average" interval from default to settlement of slightly over five years. (The median interval, 1900-1939, was three years, six months.) In 1929 or thereabouts an era of generally high settlement rates came to a close and a period of extreme slowness of settlement began. For the combined industries the implied interval from default to settlement was about four years during 1900-1929 (median, two years, nine months); in the decade after 1929 it rose to about nine years (median, 1930-39, four years, five months).

Over and above specific problems confronting individual obligors, which might be expected to offset one another in the average for a group, are general legal and economic considerations that bear on the duration of defaults, influencing behavior as between groups. In the legal or quasi-legal category are such factors as the current status of the laws relating to receivership and bankruptcy, the degree of regulation and supervision imposed on the industry group, and the variety and complexity of the legal claims running against the obligors (the complexity

[21] Various formulas based on settlements were tested in addition to those used in constructing Tables 23 and 24. While the results differed considerably as to level, nevertheless industry, size, and trend comparisons based on them generally remained invariant with respect to rank. It will be recalled that in Chapter 2 turnover rates and medians similarly differed and yet agreed: the implied number of years varied as between the two types of measurements, but rank and trend implications were mutually substantiating.

of their capital structures). Under the economic heading, the most important set of forces influencing ease of settlement is the level and direction of earnings, for when earnings are low and falling it is quite difficult to arrange a plan of settlement that will be both fair to the senior creditors and acceptable to junior and equity interests.[22]

The influence of such legal and economic factors on the speed of settlement is clearly revealed in the settlement rates for the various industry and size groups in Table 24. For example, the railroads generally have complex capital structures as compared with other industry groups, and in some respects are more closely supervised during reorganization. Moreover, their earnings were extremely low throughout the thirties. Thus for the full period studied and for each of the subperiods shown in the table, their average settlement rates were low as compared with those of the other industry groups, particularly so for the periods beginning in 1930. The corresponding rates were always higher for industrials, where earnings responded more quickly to improved business conditions after 1932, where capital structures have generally been simpler, and where there has been somewhat less regulatory supervision over reorganization proceedings. As their settlement rates imply, obligors in the utility field have usually occupied a position intermediate between rails and industrials with respect to speed of settlement. While normally subject to close regulation, the capital structures of the operating companies are typically less complex than those of the railroads, and their earnings were maintained in the thirties. The ranks of the median intervals from default to settlement in general support those conclusions: for the period 1900-1939, they were eight years, six months for rails; two years, nine months for utilities; and two years, three months for industrials.

Small issues had roughly the same settlement rates as large issues before 1930 and maintained a high rate thereafter, whereas the rate for large issues fell very low. The majority of the small

[22] As the United States Supreme Court observed in a leading case: "Findings as to the earning capacity of an enterprise are essential to a determination of the feasibility as well as the fairness of a plan of reorganization." (*Consolidated Rock Products Co. v. DuBois*, 312 U.S. 510, 525 [1941], quoted by DeForest Billyou in "A Decade of Corporate Reorganization under Chapter X," *Columbia Law Review*, Vol. 49, p. 498.)

defaulted issues in this period were obligations of industrial and public utility corporations, groups which, as we have seen, had less difficulty in effecting reorganization than the rails. Moreover, the obligors of small issues were on the average smaller in asset size than those of large issues and presumably had less complex capital structures.

Table 24 also presents average settlement rates for contraction and trough years in general business activity and for expansion and peak years. The settlement rates were lower in contraction than in expansion years for all groups except industrials, for which the two rates were practically identical. This finding is supported by the fact that settlement rates on interest and principal defaults, like the par amounts of such settlements, show low positive conformity with business cycles. The full-cycle conformity indexes for the settlement rates, calculated on a I-V basis, are: +16 for the combined industries, +37 for rails, −16 for utilities, +26 for industrials, +26 for large issues, +26 for small issues.

Table 23, which pertains to settlements of total defaults, indicates that over most periods the interval between default and settlement was from one to two years lower on total defaults than on interest and principal defaults alone. Since issues with a zero interval between default and settlement are included in the total defaults, the difference in the intervals shown by Tables 23 and 24 is in the direction to be expected. Otherwise, the rates for total defaults tell essentially the same story as those based on interest and principal defaults. The settlement rates were uniformly higher in the early period than after 1929, and were always higher in expansion and peak years than in contraction and trough years. Moreover, the rates were lowest for rails and highest for industrials. Like interest and principal defaults, total defaults in the thirties were more quickly settled on small issues than on large.