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INTRODUCTION AND SUMMARY OF FINDINGS

INVESTMENT quality is an elusive concept, as is investor experience. Neither can be defined precisely because of the multiplicity of investor preferences. Since different investors have different objectives, securities suitable for one portfolio may be entirely unsuitable for another. Small investors are unable to diversify against the risk of default and must seek to obtain securities that are individually "safe" if they are to avoid ruinous default losses. Large investors may be less directly concerned with the riskiness of individual investments because of the possibility of averaging capital gains and losses, but are frequently restricted by various legal or self-imposed constraints designed to avoid areas of excessively high default risk. Some investors, and they may be large or small, require liquidity in the bond account and therefore seek salability and price stability. Others, such as life insurance companies, may have little interest in liquidity per se, if the net flow of funds available for investment is regularly in their favor or if the contracts running against them are typically long term. These are but a few possibilities; the variety of investment objectives is endless. It follows that no single index of investment quality, and no single measure of investment experience, can be equally relevant to all investors.

In exploring the relationships between bond quality and investor experience, a practical approach must be taken to these matters. Although not all investors have the same requirements, most of them do utilize similar measures, or standards, of quality when selecting corporate bond investments. These measures are essentially devices for ranking fixed-income securities in order of the prospective risk of default. From the statistical point of view, the problem is to classify securities by the various measures of prospective quality in common use, and to determine retrospectively the actual performance of the securities in each class—taking into account not only rate of default but also rate of loss and realized rate of return.

STATISTICAL MEASURES OF BOND QUALITY AND INVESTOR EXPERIENCE

The most general measures of prospective quality that we have examined are the ratings assigned by the investment agencies,

selected state lists of bonds eligible for savings bank investment, and a market rating especially constructed for this report from price quotations. Other specific characteristics of bond issues directly or indirectly related to bond quality in the prospective sense are also examined: the margin of safety (ratio of net income to gross income of the companies offering the bonds), the times-charges-earned ratio (ratio of income before fixed charges to charges), the lien position, the size of issue, and the asset size of obligor.

The most popular measures of prospective bond quality are the ratings assigned by the four investment agencies: Moody's, Fitch, Standard Statistics, and Poor's (the latter two were merged in 1941 and issued a single rating thereafter). Since there is a fair degree of uniformity among the ratings assigned by the investment agencies, it is possible to combine them into a single composite, which typifies the ratings assigned by the individual agencies. The composite rating used in this report is a median of individual coded ratings, where the rating I was assigned to the best grade under each system (i.e., Moody's Aaa, Standard Statistics A1+, etc.); the rating II to the next best grade (Moody's Aa, Standard's A1, etc.); and so on. Issues having composite grades I-IV in this system are usually considered to be of investment grade; that is, they are eligible for commercial bank investment, are fully "amortizable" for life insurance companies (are permitted to be carried on the companies' books at full amortized book value), etc. The lower grades (V-IX) are considered to be predominantly speculative by most investors.

The legal selections analyzed in this report consist of corporate bonds listed among eligible investments for savings banks in Maine, Massachusetts, and New York. The laws of those states were prototypes for other states, and their published lists were available for much of the period covered by our special records. Although the prestige of the legal lists has suffered in recent years, they are still consulted by many investors outside the savings bank field. Aside from exemptions now provided by so-called "basket provisions" in the laws of most of the states, savings banks must select their corporate bond investments from securities on the legal lists. The same is true of trust funds in New York State, unless the donor or testator specifically exempts the trustee from that restriction.

The market place also, through its daily quotations, is continu-

ously engaged in the process of ranking corporate bonds in order of prospective quality. The market rating used to reflect this ranking is simply the yield spread, or algebraic difference between the yield promised to maturity on a particular security, on a certain date, and the yield promised on the very best corporate bonds then outstanding with the same term to maturity. Thus if a given bond issue maturing in, say, twenty years sold on a particular date to yield 5 percent, and the yield on the "best" (lowest yielding) twenty-year maturities outstanding was then 4 percent, the market rating assigned to the issue was 1 percent. Roughly speaking, the market rating is the risk premium in yield discussed by Alfred Marshall, A. C. Pigou, F. Lavington, and other neoclassical economists.

These and other prospective measures of bond quality were compared with various measures of investor experience: default rates, realized yields, and loss rates. The latter are in effect retrospective measures of bond quality, i.e., measures of quality as judged by past performance. Each of the measures was calculated for the entire group of bonds studied and for subgroups over selected assumed investment periods.

The field of investigation is the universe of straight corporate bonds offered during 1900-1943, including those outstanding on January 1, 1900. Straight corporate bonds are defined as fixed-income, single-maturity bonds offered by domestic business corporations and held by the domestic investing public. The study covers all large straight issues (those with total offerings of \$5 million or more) of railroad, public utility, and industrial corporations, and a representative 10 percent sample of small straight issues (under \$5 million). Excluded are real estate mortgage bonds (principally issues secured by office buildings and residential property) and bonds of financial corporations.

Life-span default rates, showing the proportions of the par-amount totals of bond offerings in the different quality classes at offering that went into default at any time between offering and extinguishment, were calculated for all large issues and for the sample of small issues. In addition, default rates were calculated for issues outstanding over selected chronological periods. The periodic default rates represent the proportions of the par-amount totals of included issues outstanding at the beginning of the selected periods, classified by prospective quality at that time, that went into default before the end of those periods. The pe-

periods studied comprise all eleven of the four-year intervals, 1900-1903, 1904-07, and so on, and nine longer periods. The periodic default rates serve as a useful check on the life-span default rates, and have the additional advantage of showing the comparative performance of issues in different quality classes under identical economic conditions.

The other basic measures of investor experience consist of the realized yield and the loss rate, the latter obtained by subtracting the realized yield from the yield promised at the beginning of the investment period. The promised yield is the yield that would be obtained by the investor under the bond contract if the issue were paid in full at maturity with no prior delay in the payment of interest; it is the one given in ordinary bond values tables. The realized yield, like the promised yield, is computed at compound interest but takes into account dates and amounts of actual payments received by the investor.

Although in computing the promised yield it is assumed that the bond will be paid in full at maturity, by the end of 1943 this was true of only slightly over 10 percent of the par amount of all issues studied (i.e., outstanding in 1900 or offered 1900-1943). For that 10 percent the yield realized from offering to extinguishment was the same as the promised yield, and the loss rate was zero. The remaining issues were either called, went into default, or were still outstanding on January 1, 1944 with no prior delay in the payment of interest. For such issues, the realized yield generally exceeded or fell short of the promised yield, depending upon whether the issue was called, defaulted, or was selling at the end of the period studied above or below the investors' amortized book value. (The realized yield on bonds outstanding on January 1, 1944 is defined as the yield that would have been realized if the bonds had been sold at that time.)

The loss rate is a derived measure obtained by subtracting the realized yield from the promised yield. Although calculated in that way, for some purposes it is more conveniently thought of as an adjustment factor applied to the promised yield to obtain the realized yield. Usually, the life-span loss rate is positive for defaulted bonds (indicating a capital loss), zero for bonds paid in full at maturity, and negative (indicating a capital gain) for bonds called at a premium or extinguished by other contractual devices such as conversion. The loss rate is the retrospective measure of the market rating in that it is what the market rat-

ing would have been if investors had possessed perfect foresight at offering.¹

For broad aggregates the coverage of the yield data was very good. Complete information needed to compute promised yields, realized yields, and loss rates could be obtained for over 97 percent of the par-amount total of offerings of the large issues, and for about two-thirds of the corresponding total for the small issues in the 10 percent sample. As would be expected, the coverage was better for some periods than others, and for large issues in which there was a broad public interest than for small issues and direct placements. There was no pronounced trend in coverage over the full period studied, since improved reporting on publicly placed issues was offset in the late thirties and early forties by the growth of private placements.

AGGREGATE EXPERIENCE

Before considering the detailed records relating to the default and yield experience of bonds in different quality classes, several points about aggregate behavior are worth noting. Since the basic records cover virtually all large issues offered and outstanding during the period studied, and a large sample of small issues (which were adjusted by weighting to cover all small issues), the aggregates reflect accurately the over-all experience of investors holding corporate bonds.

During the period 1900-1943, \$71.5 billion par amount of straight bonds of domestic corporations were offered to and acquired by the investing public. Of that amount 93 percent consisted of regular offerings; the remaining 7 percent, of contract modifications and exchanges growing out of corporate reorganizations. The latter, called irregular offerings in this report, initially sold at extremely high promised yields (12.3 percent on the average), but the yields actually realized from offering to extinguishment were even higher (13.7 percent), so that investors holding them obtained average capital gains of 1.4 percent per annum. The 93 percent of regular offerings breaks down into 12 percent paid in full at maturity, 37 percent called, 18 percent defaulted, and 26 percent outstanding on January 1, 1944 with a perfect contractual record through that date. The zero loss rate on the issues

¹ The concepts of default rates, loss rates, and promised and realized yields, with other definitional matters, are discussed fully in Chapter 1 (pages 41-43 and 50-51).

paid in full at maturity has been mentioned (realized yield equaled promised yield). On the defaulted issues the average life-span loss rate was 3.7 percent. But the remarkable fact is that capital losses on defaulted issues were just offset by capital gains on irregular offerings and on regular offerings called or selling in 1944 above amortized book value. The weighted average promised and realized yields on total offerings both worked out at 5.6 percent, so that for the universe of corporate bonds the net loss rate was zero. This finding is a tribute to the ability of domestic business corporations to service their long-term obligations in a turbulent period of forty-four years during which there was a great war, a great depression, and the start of a second great war.

It may, of course, be objected that the purchasing power of the dollar based on consumer prices shrank by about one-quarter between the entry of the United States into World War I and the close of the period under investigation. (Based on wholesale prices, the purchasing power of the dollar actually increased over that period; the great decline in the value of the dollar after World War II came too late to affect our study.) With respect to price changes generally, however, it should be noted that corporate bonds are held largely by institutional investors having fixed-dollar claims running against them. Such institutions are not directly affected by changes in the purchasing power of the dollar, aside from secondary effects on costs of operation. Their owners or beneficiaries are, of course, most vitally affected.

Unusual economic developments during the years 1900-1943 also raise questions as to the representativeness of the period studied. Although the loss rate was zero on corporate bonds over the full period, it was definitely not zero for most of the subperiods. Since our records terminate on January 1, 1944, they are heavily weighted by the catastrophic default rates of the Great Depression. For analytical purposes, however, this may be a virtue rather than a weakness since it permits an examination of the behavior of corporate bonds under the most adverse circumstances. Corporate bonds have been virtually default-free since World War II, so that if the record were extended up to the present it would show realized yields above promised yields and net capital gains on bonds offered since 1900. Barring another major depression, our estimate of a zero loss rate on corporate bonds held from offering to extinguishment is a conservative one.

Within the full period studied, marked discrepancies occurred

in the yields and loss rates on bonds offered and extinguished in different periods. Generally speaking, experience was best with bonds offered and extinguished before, say, 1932, and with bonds offered and extinguished thereafter; it was poorest with bonds offered before 1932 and still outstanding on that date, so that they were exposed to the heavy default risks of the Great Depression. For example, of the total par amount of large issues offered and extinguished during 1900-1931, 83 percent was called or paid in full at maturity, and 17 percent defaulted. For that period, premiums obtained on called bonds more than offset losses suffered on defaulted bonds, so that the weighted average realized yield was 6.4 percent versus a yield of 6.2 percent promised at offering; that is, investors obtained life-span capital gains of 0.2 percent per annum. The record was similar for bonds offered and extinguished in the period 1932-43. Of that group, 96 percent (by volume) was called or paid in full at maturity, and only 4 percent defaulted. The average realized yield on such issues was 6.0 percent versus a promised yield of 4.9 percent, so that investors, on the whole, obtained capital gains at the rate of 1.1 percent per annum. This is in sharp contrast to the experience record of bonds offered in the period 1900-1931 and extinguished during 1932-43, which shows only 77 percent called or paid in full at maturity, and 23 percent defaulted. The weighted average yield promised at offering on those investments was 5.4 percent versus a yield realized of only 4.6 percent, so that in the aggregate investors suffered losses at the rate of 0.8 percent annually.

Throughout the study, realized yields and loss rates were significantly affected by default and call experience, both for bonds offered and extinguished in different periods, and for outstanding issues held over assumed chronological investment periods. Generally speaking, during periods of rising interest rates few issues were called, and capital gains obtained through call premiums were insufficient to offset default losses. Contrariwise, in periods of falling interest rates many issues were called, and although default losses were occasionally heavy, they were usually more than offset by call premiums. Aggregate experience on corporate bonds is therefore particularly sensitive to the trend of interest rates over the period of investment, and to the business cycle and other factors affecting default experience.

BEHAVIOR OF CORPORATE BONDS IN
DIFFERENT QUALITY CLASSES

When investor experience is examined in the light of prospective measures of quality assigned at the beginning of investment periods, several typical patterns emerge, along with a number of interesting differences, as the selections of different rating systems are compared. The typical or basic patterns of behavior are quite pronounced throughout the data. Let us turn to them first, before exploring the differences.

Typical Patterns of Corporate Bond Behavior

A few summary statistics pertaining to the behavior of straight corporate bonds classified by the more important measures of prospective quality at offering are brought together in Table 1.

TABLE 1—Life-span Default Rates, Yields, and Loss Rates for Bonds Classified by Industry, Quality, and Other Characteristics at Offering, 1900–1943

	<i>Default Rate</i>	<i>Promised Yield</i>	<i>Realized Yield</i>	<i>Loss Rate</i>
All Industries	17.3%	5.3%	5.4%	-0.1%
Railroads	28.1	5.5	5.2	0.3
Public utilities	10.6	5.0	5.4	-0.4
Industrials	14.8	5.4	5.8	-0.4
<i>Agency Rating</i>				
I	5.9	4.5	5.1	-0.6
II	6.0	4.6	5.0	-0.4
III	13.4	4.9	5.0	-0.1
IV	19.1	5.4	5.7	-0.3
V-IX	42.4	9.5	8.6	0.9
No rating	28.6	4.8	4.6	0.2
<i>Legal Status</i>				
Legal in Maine	7.1	4.0	4.9	-0.9
Not legal in Maine	19.2	5.5	5.5	0.0
Legal in Massachusetts	7.6	4.0	4.7	-0.7
Not legal in Massachusetts	18.5	5.4	5.5	-0.1
Legal in New York	9.0	4.0	4.5	-0.5
Not legal in New York	18.8	5.5	5.5	0.0

TABLE 1
(concluded)

	<i>Default Rate</i>	<i>Promised Yield</i>	<i>Realized Yield</i>	<i>Loss Rate</i>
<i>Market Rating</i>				
Under ½%	10.5%	3.8%	3.9%	-0.1%
½-1	13.9	4.5	4.7	-0.2
1-2	20.7	5.4	5.5	-0.1
2% and over	32.4	9.3	9.5	-0.2
<i>Times-Charges-Earned Ratio</i>				
3.0 and over	2.1	4.0	4.9	-0.9
2.0-2.9	4.0	4.3	5.1	-0.8
1.5-1.9	17.9	4.7	5.0	-0.3
1.0-1.4	34.1	6.8	6.4	0.4
Under 1.0	35.0	6.2	6.0	0.2
<i>Ratio of Net Income to Gross Income</i>				
25% and over	3.3	4.5	5.0	-0.5
20-24	11.6	4.6	4.6	0.0
15-19	12.7	4.4	4.8	-0.4
10-14	17.6	5.1	5.3	-0.2
Under 10%	27.5	5.0	5.0	0.0
Negative	17.2	8.9	10.7	-1.8
<i>Lien Position</i>				
Secured	18.8	5.3	5.4	-0.1
Unsecured	13.6	5.3	5.3	0.0
<i>Size of Issue</i>				
\$50 million and over	16.3	4.9	5.0	-0.1
20-49	16.4	5.2	5.7	-0.5
5-19	19.0	5.7	5.5	0.2
Under \$5 million	24.9	6.3	6.1	0.2
<i>Asset Size of Obligor</i>				
\$200 million and over	16.4	5.4	5.3	0.1
100-199	17.0	5.0	5.8	-0.8
5-99	18.8	5.6	5.7	-0.1
Under \$5 million	23.6	6.6	6.6	0.0

From Tables 11, 33, 39, 47, 51, 60, 66, 84, 85, 89, 90, 93, 98, 105, 106, 109, 111, and special supplementary tabulations. Data for size of issue and asset size of obligor are based on large issues (\$5 million and over) and an adjusted 10 percent sample of small issues; data for other classifications are for large issues only. Default rates exclude irregular offerings (made during corporate reorganizations, etc.). For further explanation of the varying coverage of the data in the several classifications, see the tables referred to.

The first column contains life-span default rates by composite agency rating at offering, legal status at offering, and other quality measures. As has been indicated, life-span default rates are retrospective measures of quality: they represent the proportion of the par-amount total of bond offerings in each of the prospective quality classes that went into default at any time between offering and extinguishment.

Even the highest grades of corporate bonds, it is shown, were not entirely free of the risk of default; but virtually all of the prospective measures of quality provided reliable rankings in regard to such risk. In other words, the retrospective quality of bond offerings as measured by default rates declines as we move down the scale of each of the major prospective measures of quality. The inverse relationship between prospective quality and default rates held almost uniformly throughout the indicated classes of the table for agency ratings, legal status, market ratings, time-charges-earned ratios, ratios of net income to gross income, size of issue, and asset size of obligor. The results thus provide confirmation of the reasonableness of the quality measures generally used by investors in selecting corporate bond investments. The similarity of the patterns of default experience when classified by the major quality measures arises largely from the fact that the same basic information is utilized under each of the rating systems. That is to say, the investment agencies, the legal lists, and the market typically assigned high rankings to the large issues of large obligors on which fixed charges were earned a large number of times at offering. Although the weights assigned to the different elements of bond quality are not the same under each system, subsequent chapters demonstrate that there is reasonable agreement among them as to the basic elements of strength.

One of the most significant points brought out by the table is the marked difference among major industry groups in life-span default rates on their bond offerings. The rails had the poorest record in that respect, although, as subsequent chapters indicate, the investment agencies, legal lists, and market all favored the rails at offering. In consequence, the default rates for bond offerings classified within industry by the various quality measures are usually more closely associated with quality than the figures for the combined industries indicate. The same is true for outstanding issues held over assumed chronological investment pe-

riods. As a general rule, the various rating systems were efficient in ranking issues within industry but were less successful in judging default risks as between major industry groups.

The picture presented by the comprehensive data of the table is also clouded by the lumping together of bonds offered and extinguished in different periods. The frequency of default is closely associated with general business conditions, both with the short-run ups and downs of business and with the major investment cycle of the nineteen twenties and thirties. Since default rates differ so greatly for bonds offered and extinguished in different periods, and for bonds held over different chronological investment periods, the pooling of data for the full period studied obscures the underlying relationship between prospective and retrospective quality. In general, the relationship between quality and default risk is much sharper when we examine issues of a given industry held over uniform investment periods. Within industry, and for issues held over similar investment periods, the rating systems were quite accurate in ranking issues in order of default risk. The principal errors of judgment committed by the rating systems arose from a failure to appraise accurately the earnings trends of the different industries and to allow fully for cyclical risks.

An inverse relationship to quality also appears among the yields promised at offering for bonds classified by the various quality measures, although again the relationship is blurred to some extent by the lumping together of data for different industries and for different investment periods. As would be expected, the yield promised the investor at offering, which is itself a rough measure of prospective quality, rises as other quality measures decline. Changes in the industry preferences of investors, and trends and cycles in the level and structure of interest rates and bond yields, tend to obscure the inverse relationship between quality and promised yield in the aggregate data, but the relationship is so strong that they do not obliterate it.

One of the most significant questions to be answered from materials of this type is the relationship between the prospective measures of quality at offering (and at the beginning of assumed chronological investment periods) and the yields actually realized by investors. Realized yields, it will be recalled, exceeded promised yields for bonds extinguished by call (principally high grades), and fell short of them for bonds extinguished after de-

fault (principally low grades). Since promised yields and default losses both rise as quality declines, the one partially offsets the other. What, then, is the observed relationship between prospective quality and the yields actually obtained by investors after full allowance is made for capital gains and losses?

The table indicates a clear-cut, long-run relationship between bond quality at offering and the yields actually obtained by investors. On the average and over long periods, the life-span yields realized on high-grade bonds were below those on low-grade bonds, with the result that investors, in the aggregate, obtained better returns on the low grades. The inverse relationship between prospective quality and realized return was not so pronounced, however, as that between quality and promised yield or between quality and default risk. As a result, the loss rate (difference between promised and realized yields) rose for successively lower grades of bonds and even turned from negative to positive for some quality measures. On high-grade bonds, capital gains from call premiums were fairly general; and on low-grade bonds, either lower capital gains or capital losses from defaulted issues.

The foregoing may be summarized as follows: (1) Investors, in the aggregate, paid lower prices for, and thus exacted higher promised yields on, the low-grade issues; (2) default rates on the low grades were higher than on the high grades; (3) loss rates, which take into account not only default losses but also capital gains, were higher on low-grade issues; (4) the higher promised returns exacted on the low grades at offering proved to be more than sufficient to offset the higher default losses; (5) in consequence, life-span yields realized on low grades were higher than on high grades. The results were quite typical within major industry groups. Similar results were obtained for most of the longer assumed chronological investment periods.

The major conclusion that investors obtained higher returns on low-grade issues than on high grades should not be accepted without proper qualification. For it cannot be emphasized too strongly that this finding emerges only when broad aggregates of corporate bonds are considered over long investment periods, and given the price and yield relationships that existed during those periods. In effect, the aggregate results reflect the experience of all investors over long periods, rather than that of any particular investor over any given short period. Another quali-

fication is that realized yields and loss rates were not nearly so regularly related to quality as were promised yields and default rates. Because of the disparity in the performance of low-grade bonds, small investors (and many large investors that may have been inhibited from practicing the broadest type of diversification) would frequently have fared best by holding only the highest grade obligations. This conclusion follows both from the higher average default rate on low-grade securities and from the wider scatter of realized yields obtained on them over given periods. A third qualification is that realized yields were subject to extreme aberrations over time, since they reflected not only the risks of the business cycle but the state of the capital market as well. The average yields realized over selected periods of offering and extinguishment, or over selected chronological periods during which the issues were outstanding, indicate that the market usually overpriced low-grade issues (and underestimated default risks) at or near peaks of major investment cycles. As a general rule, low grades fared better than high grades when purchased near troughs and sold near peaks of the investment cycle; but by the same token, losses were heavy on low grades purchased near peaks and sold near troughs. The same is true of investments in declining as against growing industries. Low-grade issues of a declining industry rarely worked out as well as high-grade issues.

The finding that realized returns were higher on low-quality corporate bond issues than on high-quality issues has implications for investment theory as well as for practical investment policy. The result appears consistent with either of two views of the factors involved in the formulation of promised yields. One is the neoclassical economists' conception that promised yields contain three roughly additive components: the basic yield on the highest grade of bonds outstanding with similar maturities; a pure risk premium, sufficient, when averaged over a large number of similar obligations, to offset net default losses; and a component for risk bearing. The other view is based largely on institutional considerations.

The concept of a premium for risk bearing, which would explain the higher returns actually obtained on low-grade issues, implies that investors are unable to diversify adequately to average out default losses. This concept would appear to fit best an atomistic market comprised of a large number of small in-

vestors. For, if all investors had sufficient funds at their disposal to average out default risk, there would be no need of a component for risk bearing, except possibly for the extra costs incurred in servicing a high risk portfolio. From materials available on corporate bond outstandings, and from balance sheet records of institutional holdings, it appears that the corporate bond market has been dominated for at least the last quarter century by large investment intermediaries. Such investors, who through their bidding largely determine the prices and promised yields of corporate bonds, are able to diversify adequately and thus do not require a specific premium for risk bearing. The investment intermediaries, are, however, closely regulated as to the type and quality of securities that may be purchased, and their investment officers, through their close ties with the general public and their directors, would be embarrassed if their portfolios contained a large volume of defaulted obligations, even though no loss should ultimately result. As a general rule, institutional investors are fairly conservative and place a premium on quality, just as do small investors who seek to avoid ruinous default losses through the purchase of high-grade bonds. The result is that promised yields on low grades—averaged over long investment periods—are more than sufficient to offset default losses, so that realized yields on low grades are high. These institutional considerations rest on personal observation rather than on statistical evidence; but either view—the neoclassical or the institutional—is consistent with the record, and indeed both may be partially correct.

Before leaving the table, two final points deserve comment. One is that the secured issues (issues secured by mortgage, collateral, or leasehold) behaved more nearly like low grades during the period studied than did unsecured issues (debentures). For the combined industries this is evident only in the life-span default rates, but within major industry groups promised and realized yields were higher on secured issues. The principal reason why unsecured issues behaved more nearly like high than low grades is that usually only the best credit risks could float debentures during the period under review; among corporations whose future earnings were doubtful, investors looked to a lien on assets for protection in possible default situations. In consequence, earnings protection was frequently less for secured issues, and they went

into default more frequently than unsecured issues, but provided slightly higher realized returns.

The second point is that large issues and issues of large obligors behaved more nearly like high grades than small issues and issues of small obligors (the two size measures are, of course, inter-related). The market generally, along with the rating agencies and the legal lists, has shown a preference for the power and financial strength of large corporations and for the liquidity of large issues. Promised yields and market ratings were therefore lower for large issues and for issues of large obligors than for other issues. As the table shows, default rates and loss rates were also lower for the large size groups than the small; the market's preferences were justified by experience. On the other hand, default losses on the small size groups were not sufficiently high to offset the higher yields promised at offering so that realized returns were larger on the smaller issues and issues of small obligors. In general, therefore, issues in the high-quality classes (including large issues of large obligors) had the lowest default rates, promised yields, and loss rates; but the returns obtained by those who held them over long periods were generally below those on low-grade issues.

Comparative Experience

In analyzing the comparative experience of corporate bonds as appraised by the different prospective quality measures, particular attention was given to selected groups of high grades: namely, issues in the first four agency rating grades; those on the legal lists of Maine, Massachusetts, and New York; and equivalent lists of high grades selected by means of the market rating. Such issues are not only conceived of as high grade by most investors, but at one time or another have been eligible for investment by financial intermediaries under various state and federal laws and have been fully amortizable for valuation purposes. Since default rates are generally lower the more restrictive the list of investments, analytical adjustments were made in so far as possible for differences in the volume of securities meeting the different tests. For example, in comparing the experience record of issues rated in the first four grades by the investment agencies with those rated high grade by the market, the issues were arrayed from highest to lowest grade by market rating and the best issues having a par-amount

volume approximately equal to those rated I-IV by the agencies were compared with the latter group.

Several interesting differences were revealed by these comparisons. For most of the chronological periods studied, the market was less stable than either the agency ratings or the legal lists, in the sense that the proportion of the total volume of outstanding issues rated high grade by the market at the beginning of a given period that was still so rated at the end of that period was below the corresponding proportion based on legal bonds and agency ratings. Since the market rating is extremely sensitive to bond market conditions, this type of standard has been subject to frequent revisions when it has been used officially for the regulation of institutional investments.

Being so sensitive, the market rating usually reflects changes in the credit standing of obligors more promptly than other ratings do. As a result, default rates over four-year periods were usually lower for high-grade outstandings selected by market rating than for equal volumes of high grades selected by agency rating or legal status. Life-span experience on bond offerings showed just the reverse: defaults were heavier among the market-selected high grades than among equal volumes rated high grade by the agencies or included on the legal lists. The reason again is the extreme sensitivity, amounting almost to instability, of the market rating to changing conditions, with the result that a fixed market-rating standard applied at offering picks up a disproportionately large volume of offerings in years of market optimism and a disproportionately small volume in years of market pessimism. Since bonds offered in years of market optimism fared worse than those offered in other years, life-span default rates were higher on offerings selected by a fixed market-rating applied to all offerings over the full period studied than on offerings selected by agency rating. The same proves true of the market rating versus the legal lists, when allowance is made for the large volume of rail bonds on the lists of the three states investigated. The instability of the market rating over time and its accuracy in predicting default risk at a given instant are brought out by the fact that outstanding issues had lower default rates over four-year periods when selected by the market rating than by other quality measures. The market rating was also a more accurate predictor of life-span default risk than other quality measures when applied annually to offerings rather than as a fixed standard over the full period studied. Our

conclusion, therefore, is that the market rating was unstable over time, but was an efficient device for ranking offerings and outstandings at any given moment in order of the risk of subsequent default.

Similar but opposite patterns were observed in the realized yields on equally inclusive lists of securities selected by means of the three rating systems. With regard to the behavior of outstanding issues over selected chronological periods, the very fact that the market was the most efficient selector of issues with low default risk worked against it as a selector from the standpoint of realized returns. Risk premiums in promised yields were smaller for high-grade market-rating lists than for other equal-volume lists of high-grade investments, so that realized yields obtained over assumed chronological investment periods were usually less for the market selections than for the other lists. An analysis based on corporate bond offerings since 1920 reveals a similar pattern for high grades selected by a fixed market-rating standard. Again, the market rating was unstable. The bond market was excessively bouyant in the late twenties, so that a list selected to meet a fixed market-rating standard was heavily weighted in favor of the offerings of that period. Since many of these offerings later went into default, the average life-span yield realized was lower for the market-rating group than for the other lists, and the average loss rate was higher.

Comparisons of equal-volume lists of high-grade bonds based on legal status and agency ratings reveal little of statistical or practical significance. The data suggest that the investment agencies may have been slightly more sensitive to impending defaults than the legal lists (possibly because of the heavy bias of the latter towards rails), but neither of these two systems of security selection was markedly superior to the other, either in this or in other respects.

BEHAVIOR OF DEFAULTED BONDS

One of the most persistent and most pronounced phenomena observed in the data is the propensity of the market to undervalue corporate bonds at or near the date of default. Two results flow immediately from this finding. One is that capital losses were extremely heavy on bonds that were purchased at offering and sold at default. The other is that returns were equally large to investors who purchased at default and held until the issue was extin-

guished. Summary statistics bearing on this matter are shown in Table 2.

The average yield promised at date of first offering on all large corporate bonds that went into default was 6.4 percent, versus a yield realized from offering to default of minus 3.4 percent. That is to say, investors unfortunate enough to purchase bonds that later went into default and to liquidate them at default obtained an annual return 9.8 percent less than the yield promised at offering. This represents the annual rate of capital loss on bonds amortized at the promised yield of 6.4 percent and sold at date of default. The table shows roughly similar results throughout each of the major industry groups. On the other hand, yields realized on bonds purchased at default and held to extinguishment were usually attractive, averaging 20 percent per annum for the combined industries, 17 percent for public utilities, 19 percent for rails, and 26 percent for industrials. Because of the rapid recovery of bonds after default, the loss rate on defaulted obligations held from offering to extinguishment averaged far below that on bonds sold at default, and the return realized turned from negative to positive. It is interesting to note that life-span yields realized on defaulted bonds over the period studied were not far below the yields promised on some of the best bonds offered in the forties and early fifties. The detailed default records show that the largest losses occurred on bonds sold during the depressed thirties (and the largest gains, on those purchased then); but the phenomenon of unduly depressed prices at date of default is observable in other periods as well. The conclusion appears unmistakable: on the average, investors who sold at default suffered unnecessarily large losses, and those who purchased obtained unusually large gains. It is unfortunate that many financial intermediaries were forced by their directors or by regulatory authorities to sell at that time.

Clear-cut patterns again emerge in the experience records of defaulted bonds classified by the various prospective measures of bond quality at offering. As the table indicates, yields realized on defaulted bonds purchased at offering and sold at default were usually lower, the lower the prospective quality at offering. This reflects in part the price instability of low-grade bonds generally and the concern of investors that the low grades might be treated unfavorably in reorganizations. Since promised yields at offering were higher for low than for high grades, the differences between the promised yield and the yield realized from offering to default (i.e.

TABLE 2—Yields and Loss Rates up to Default, after Default, and over Life Span of Issues Defaulting 1900-1943, Classified by Quality at Offering
(large issues only)

	Promised Yield at Offering	FIRST OFFERING TO DEFAULT		Default to Extinguishment, Realized Yield	FIRST OFFERING TO EXTINGUISHMENT	
		Realized Yield	Loss Rate		Realized Yield	Loss Rate
All industries	6.4%	-3.4%	9.8%	20.0%	2.3%	4.1%
Railroads	6.1	0.1	6.0	18.6	3.3	2.8
Public utilities	6.4	-4.9	11.3	17.0	1.7	4.7
Industrials	6.9	-7.5	14.4	25.8	1.4	5.5
<i>Agency Rating</i>						
I	4.7	1.8	2.9	18.3	3.1	1.6
II	4.7	-2.1	6.8	21.5	1.7	3.0
III	5.5	-5.6	11.1	23.0	1.3	4.2
IV	6.3	-6.2	12.5	28.1	1.7	4.6
V-IX	9.5	-8.4	17.9	23.1	1.7	7.8
<i>Legal Status</i>						
Legal in Maine	5.1	-9.7	14.8	26.0	0.3	4.8
Not legal in Maine	7.3	-8.7	16.0	30.8	1.3	6.0
Legal in Massachusetts	5.1	0.1	5.0	25.9	2.3	2.8
Not legal in Massachusetts	7.2	-6.3	13.5	25.4	1.8	5.4
Legal in New York	5.2	-3.8	9.0	37.7	2.0	3.2
Not legal in New York	7.6	-7.4	15.0	26.8	1.6	6.0
<i>Market Rating</i>						
Under 1/2%	4.1	-0.7	4.8	18.8	2.3	1.8
1/2-1	4.6	-2.6	7.2	18.2	1.6	3.0
1-2	5.5	-4.9	10.4	21.3	1.7	3.8
2% and over	9.7	-2.5	12.2	16.7	3.7	6.0

From the large-issues sections of Tables 20, 38, 50, and 64, and special supplementary tabulations. Issues offered in years preceding the first official publication dates of the legal lists were excluded in determining yields and loss rates on nonlegal bonds.

the loss rate over that period) was largest for the low-grade issues. On the other hand, the recovery of the low grades from default to extinguishment was greater than that of high grades, so that the returns obtained by those purchasing low grades at default was greater. The net effect of the price decline from offering to default and of the recovery from default to extinguishment was an erratic pattern of life-span yields realized on defaulted bonds. Generally speaking, yields realized on defaulted bonds from offering to extinguishment were not markedly different for the different quality groups, although there was perhaps a tendency for the very highest grades to yield higher returns than other issues.

In conclusion, it appears that some of the best buys in the bond market during the period covered by the study were low-grade bonds near the date of default. As the preceding section has shown, low-grade bonds went into default more frequently than high grades; but the yield realized was about the same for the different quality groups. The higher returns obtained on low-grade issues that did not go into default more than offset the lower returns on defaulted bonds generally, so that for all issues combined (defaults plus nondefaults) higher returns were obtained on low-grade issues. Again, however, a word of admonition is in order: these are aggregate results, not necessarily those obtained by any particular investor.

TRENDS AND CYCLES IN CORPORATE BOND QUALITY

It is natural to ask whether the prospective and retrospective measures of bond quality reveal any significant trends or cycles over the period studied. As we shall see, the answer is in the affirmative.

Secular Movements

Let us consider first secular movements in quality as reflected in life-span default rates. These rates, plotted against year of offering, are presented in Chart 4 (Chapter 2). As the chart indicates, life-span default rates averaged nearly 40 percent on bonds offered during the first decade of the century, dropped to about 15 percent in the early twenties, rose again to about 30 percent in 1928-33, and then moved irregularly downward to 1943. Similar swings occurred in each of the major industry groups, but were most pronounced for rails. Since there was a fairly regular progression in the direction of movement of the life-span default rates—first downward, then upward, then downward again—there can be

little doubt as to the existence of secular waves of improvement and deterioration in bond quality, considered retrospectively, during the period studied.

It is broadly evident also that these waves were roughly synchronous in timing with what Burns and Mitchell have identified as turning points of major cycles. For example, Burns and Mitchell tentatively placed long-period minima of the major cycles in 1908, 1921, and 1933, and we can detect dips in the default rate on new offerings near the first two of those years. (On the basis of our records, the default rates were in a downward trend from 1933 to 1943; but the true life-span default rates for that period cannot be determined, since the extinguishment record for the majority of the offerings is not available.)

One possible cause of the long swings in bond quality is suggested by the lower sections of Chart 4, showing the net volume of bond financing (total offerings less total extinguishments) and the total volume of new-money offerings (total offerings less bond refundings). It will be noted that the default rates reached highs near years of heavy financing, lagging slightly. The general impression is that the quantity as well as quality of bond financing was related to the long swings in the investment cycle, possibly because, in periods of overconfidence, marginal issues were floated that would not have found a ready market when business was depressed. The high level of investor confidence since World War II, and the large and expanding volume of bond financing, raise important questions as to the quality of bond credit in the post-war period. Although our records do not cover this period—and even if they did, a retrospective test of quality could not be undertaken until the market had been subjected to a real test—the record of the past is sufficiently strong to suggest the need for constant review of bond market standards.

Secular trends are also identifiable in several of the prospective measures of bond quality. For example, the proportion of the total volume of new bond offerings with a high market rating (below 1 percent; that is, with promised yields less than 1 percent above those of the very best bonds with similar maturities) rose rather regularly from a low of 2 percent in 1920 to a high of 62 percent in 1930. Throughout that period there was also substantial upgrading of old issues by the market. The net volume of upgrading, measured by the excess of outstanding issues moving into the group with market ratings of under 1 percent over issues mov-

ing out of that group, averaged about \$1 billion annually in the twenties, or about 5 percent annually of the total volume of straight bond outstandings. The implication is that the risk premiums in bond yields shrank progressively in the twenties as the market became more buoyant.

It is to the credit of the investment rating agencies that, judged both by the proportion of new bond offerings rated in the top four grades, and by the volume of old issues upgraded, they did not respond to the speculative fervor of the 1920's. Thus the proportion of total rated offerings in the first four agency grades ranged around 80 percent throughout most of the twenties with no apparent trend, and dipped slightly below 75 percent in 1928 and 1929. Similarly, the net volume of upgrading by the agencies (excess of outstanding issues moving into the group rated I-IV over those moving out of that group) dropped from a positive \$1.2 billion in 1923 to a negative \$0.3 billion in 1929 (the negative figure indicating net downgrading). Thus the investment agencies, unlike the market, did not lower their standards in the twenties.

On the other hand, both the agencies and the market were deeply responsive to the business contraction of 1929-32. The net volume of downgrading by the market climbed to \$3.0 billion in 1930 and to \$7.1 billion in 1931, and the net volume downgraded by the agencies exceeded \$3.0 billion in both 1931 and 1932. As subsequent events were to prove, much of this downgrading was abortive, since many issues downgraded in the early thirties were upgraded in the late thirties and early forties.

Cyclical Movements

During the shorter periods spanned by business cycles as identified in the National Bureau chronology, there is also evidence of an ebb and flow of investor confidence. In this case, however, the investment agencies proved more responsive than the market. The net volume of bonds upgraded by the investment agencies expanded in all six of the business expansions covered by our data, and contracted in five of the six business contractions. Similar data for the market rating show little sensitivity to business cycles. Thus in ten cycles covered by the series on market rating, net upgrading rose in five business expansions and declined in the other five, and rose in three business contractions and declined in the other seven.

It is a curious fact that agency ratings should prove so sensitive to the short-run ups and downs of business, since it is frequently stated that they measure "intrinsic quality," which would seem to imply a degree of permanence inconsistent with cyclical fluctuations. In view of the conservatism of the investment agencies in the 1920's, and the excellence of their long-term forecasts of life-span default risk at offering, it is unlikely that they were affected by changes in investor confidence during business cycles. A more likely hypothesis, which we have not been able to verify within the framework of our data, is that the cyclical behavior of the ratings reflects the sensitivity of the various financial ratios on which they are based. Partial support for this supposition is provided by the fact that similar cyclical patterns were observed, for example, in the volume of securities added to and deleted from the Maine legal list, but failed to appear in the lists of Massachusetts and New York. Of the three states, Maine was the only one that applied the various earnings tests relentlessly throughout the period studied. The other states set aside the earnings tests through moratoria in the deep depression, and the volume of securities on their lists was insensitive to business cycles.

CONCLUSIONS

In this brief summary, it has been necessary to omit or touch lightly upon detailed qualifications at many points. Students of the capital market will wish to refer to the text itself, or better yet, to the supporting tables on which the text discussion rests. Brief summaries are presented at the beginning of each chapter in the hope that they will serve as useful guides to areas of special interest. As a further guide, a few of the principal conclusions are listed at this point:

- (1) Life-span yields realized on the aggregate of bonds studied equaled yields promised at offering, so that the net loss rate, measured in current dollars, was zero.
- (2) Capital gains, and capital losses, were substantial on bonds offered and extinguished in different periods, and on outstandings held over different assumed chronological investment periods.
- (3) Although the over-all record of straight corporate bonds was excellent, capital losses were large on bonds bought during the buoyant twenties that were still outstanding in

the thirties and thus subject to the heavy default risks of the Great Depression.

- (4) Agency ratings, market ratings, legal lists, and other selected indicators of prospective bond quality proved useful guides in ranking bond offerings and outstandings in order of the risk of subsequent default.
- (5) The comprehensive record indicates that the principal advantages of a high-grade corporate bond portfolio are a low default risk and loss rate, and comparative stability of prices. The disadvantages are low promised yields, and, over long investment periods, low realized rates of return.
- (6) The principal advantages of a low-grade bond portfolio are high promised yields, and, if the list is large and held over a long period, high realized yields. The disadvantages are high default and loss rates, and price instability.
- (7) For small investors, and those seeking liquidity in the bond account, the advantages of a high-grade portfolio frequently outweighed the disadvantages. For the very large permanent investors holding well diversified portfolios, the reverse frequently proved to be the case.
- (8) Comparisons of the performance of bonds classified by the various measures of prospective quality indicate that a list meeting a fixed market-rating standard was less stable than lists selected by agency ratings or legal status. The obverse of the coin is that over short periods the market rating was more sensitive to impending defaults than agency ratings or legal lists.
- (9) Corporate bonds were typically undervalued in the market at or near the date of default. As a result, investors selling at that time suffered large losses, while those purchasing obtained correspondingly large gains.
- (10) Because of the price instability of low-grade issues, realized returns were usually lower on low grades than on high grades when purchased at offering and sold at default, and loss rates were correspondingly higher. Conversely, under most rating systems, realized returns were higher on low grades than on high grades when purchased at default and held to extinguishment.
- (11) Although life-span loss rates on defaulted bonds were higher for low than for high grades, yields promised at offering were also higher, so that the realized yields ob-

- tained on the various quality groups of defaulted bonds were about the same.
- (12) The quality of corporate bond offerings and outstandings, considered both prospectively and retrospectively, was subject to secular and cyclical swings of substantial amplitude, perhaps partly because of the behavior of corporate earnings, and partly because of changes in investor confidence.
 - (13) Judged by the differential behavior of selected groups of bonds over selected periods, the errors in rating corporate bonds can be traced principally to the business cycle and to the difficulty of forecasting industry trends.
 - (14) Typical patterns of behavior, such as those outlined above, emerge only when corporate bonds are viewed in broad aggregates and over long investment periods. Wide disparity of performance was the rule for minor groupings and for bonds held over short investment periods.