Volume Title: Essays on Interest Rates, Vol. 2

Volume Author/Editor: Jack M. Guttentag, ed.

Volume Publisher: NBER

Volume ISBN: 0-87014-224-0

Volume URL: http://www.nber.org/books/gutt71-2

Publication Date: 1971

Chapter Title: The Influence of Call Provisions and Coupon Rate on the Yields of Corporate Bonds

Chapter Author: Mark W. Frankena

Chapter URL: http://www.nber.org/chapters/c4000

Chapter pages in book: (p. 134 - 186)

3

The Influence of Call Provisions and Coupon Rate on the Yields of Corporate Bonds

Mark W. Frankena

INTRODUCTION AND SUMMARY OF FINDINGS

This study examines the effect of call provisions and the coupon rate on the yields of corporate bonds. The first section reviews the function of the call option in corporate bonds and the means of providing call protection to the investor. The second section considers the extent to which and the reasons that corporate bonds actually were called prior to maturity in the period since the Accord of 1951. The third section examines the influence of coupon rate on the yield and price

NOTE: Most of the research for this study was done in the summers of 1964 and 1965; much of the empirical material was later updated to 1966. Since this work was completed, a number of improvements have occurred to me and have been suggested by others. Unfortunately, I have had to leave several of these as footnotes.

I am greatly indebted to the late Joseph W. Conard, my teacher at Swarthmore College and director of the Bureau's Interest Rate Project until his untimely death, for suggesting the problems considered in this study and for many discussions during its earlier stages. Sidney Homer of Salomon Brothers and Hutzler provided invaluable assistance in answering questions dealing with the institutions of the corporate bond market and making available much of the data underlying this study. Albert Wojnilower of the First Boston Corporation also kindly made essential data available. Phillip Cagan, Paul Cootner, and Frank C. Jen read an earlier version of the manuscript and suggested improvements. Finally, this paper would not have been completed without the generous help and encouragement of Jack M. Guttentag.

behavior of seasoned corporate bonds. The last section considers the influence of call deferments on new issue yields.

The call option is the right of a borrowing company to redeem its debt prior to maturity, generally at a few points above par. Callability has several advantages to the borrower. Most important is the ability to reduce interest costs if new issue yields decline substantially below the coupon rate on the outstanding issue. The call option also allows the borrower to eliminate restrictive provisions in the indenture of a bond, replace an issue with stock or with a different type of debt instrument, or retire an issue completely.

However, callability has important disadvantages for the lender. If the investor is concerned with holding-period yields, and hence current market prices, callable bonds are less attractive than call-protected bonds because their price appreciation is limited. Because of the threat of call when yields are low, market prices of callable bonds do not normally rise more than a point or two above the call price. As a result, the potential capital gain on callable bonds in the event of a general decline in market yields is limited. Alternatively, when callable bonds are actually called for redemption, investors may be forced to reinvest in lower yielding bonds and incur additional transaction costs.

The benefits of the call option to borrowers and disadvantages to lenders suggests the hypothesis underlying this study, that call provisions should influence the yields to maturity of corporate bonds. There are four characteristics of a bond that influence the probability that the call option will be exercised, the size of the benefits and costs of call when it is exercised, and the extent to which capital gains are limited in periods of declining interest rates. These are (1) the coupon rate, (2) the term to maturity, (3) the call price, and (4) the call deferment, if there is one. All of the bonds used in this study were long term, and no attempt was made to determine the influence of maturity on yield which results from the existence of the call option.

Given the level of new issue yields, and assuming maturities constant, the profitability of calling an issue for refunding then depends on the call price and the coupon rate. The higher the call price and the lower the coupon rate, the less profitable is refunding to the borrower. On the other hand, the higher the call price and the lower the coupon rate, the greater is the opportunity for capital gains for the investor and the less the chance of losing a high return through call. As a result, bonds with a lower call price or higher coupon rate should bear a higher yield. In addition, a bond that is immediately

callable is less attractive to investors than a bond with a call deferment, which prevents the borrower from calling the issue for a period of years after issue. Hence, bonds with deferments should carry lower yields than freely callable bonds.

The empirical part of this study is limited to consideration of the influence of coupon rate on the yields of seasoned bonds and the influence of call deferments on the yields of seasoned and new issues. Yield series were constructed for this study covering seasoned long-term callable Aa-Aaa public utility bonds, separately for bonds with a coupon rate of 2¾ to 2⅞ per cent and for bonds at each coupon rate between 3¾ and 5¾ per cent at intervals of one-eighth per cent. The series are monthly and cover the period from January 1957 through October 1967.

In analyzing the influence of coupon rate, yield spreads between each series with a coupon rate of 3¾ to 5¾ per cent and the series with a coupon rate of 2¾ to 2⅞ per cent were calculated, and multiple regressions were run to explain the variance in the spread. The regression covering all bonds "explained" 78 per cent of the variance in the spread. The independent variables used in the regression were: (1) *the coupon rate* on the higher coupon bond used in measuring the yield spread—this variable had a positive regression coefficient, indicating that a higher coupon rate is associated with a larger yield spread. (2) *The level of yields on new issues* of callable Aa utility bonds—this variable had a negative regression coefficient, indicating that when yields are lower, yield spreads due to differences in coupon rate are greater. This is partly because the price appreciation of the higher coupon bonds is restrained by call price, so that the yields on these bonds cannot continue to fall along with the yields on lower coupon bonds. In addition, at lower yields investors become more apprehensive about the greater danger of call and expect more limited capital gains on higher coupon bonds. (3) *A weighted average of changes in new issue yields* over the previous six months—this variable had a negative correlation coefficient, indicating that when yields have been falling yield spreads tend to increase. The explanation for this is that, because of the general cyclical forces affecting interest rates, falling yields generate the expectation that yields are likely to continue falling in the near future. (4) *A time trend*, indicating that yield spreads declined over the period studied—the primary explanation of the significance of trend is that the expected "normal" and cyclical minimum levels of interest rates apparently rose over the period. With rates no longer expected to fall to very low levels

during recessions, there was a reduction in the danger of call and of the limitation of capital gains on higher coupon bonds. A second explanation of the time trend is that the secular increase in funds channeled through institutional investors, together with a cumulative drought of publicly offered corporate bonds, reduced the spread due to coupon differences.

We also ran five separate regressions for bonds with each of the coupon rates from 4½ to 5 per cent. The independent variables discussed above were all used except for the coupon rate, which was held constant in each regression. In addition, we included the volume of publicly offered new issues of corporate bonds for the three months preceding the observation of yield spread. All regression coefficients had the same signs as before, and the volume variable was significant with a positive regression coefficient. This supports the hypothesis that, when the volume of new corporate issues is larger, the spread due to coupon differences tends to increase. Together these variables "explained" 81 to 89 per cent of the variance in the yield spread.

To examine how refunding deferments influence the yields of seasoned bonds, yield series were constructed at each coupon rate for bonds with refunding deferments of two years or more; otherwise, these bonds were the same as those used to derive the series on freely callable bonds. The hypotheses tested were that the call protection afforded by a refunding deferment would make a bond more attractive to investors and hence reduce its yield, and that the amount by which a deferment would reduce the yield would increase as the coupon rate increased and as the level of yields decreased. These hypotheses were confirmed. On seasoned bonds with intermediate and high coupon rates, deferments reduced yields to maturity by five to nine basis points during much of the period from 1957 to 1961, and they reduced yields by more than twice that when price appreciation on the callable bonds was limited by the call price and the prices of the deferred bonds rose a few points above the call prices.

The final part of the study examines how refunding deferments have influenced the yields on new issues. Comparisons were made of the offering yields, and the yields after the termination of the underwriting syndicate, of freely callable and deferred utility bonds offered within ten days of each other and having the same quality rating (Aaa, Aa, or A). We found that, although the data for 1957 were ambiguous, the data for 1958 through 1966 consistently supported the hypothesis that deferments reduce yields unless new issue coupon

rates are very low. In times of high coupons on new issues, refunding deferments of five years commonly reduced average yields by 9 to 14 basis points. This is in contrast to the finding of Hess and Winn, whose study of the influence of refunding deferments on the yield of new corporate issues offered from 1926 to 1959 concluded that the "length of call deferment did not influence yields except during the last six months of this 34-year period."[1] It is the contention of the present study that their conclusion was not justified by the data, and that in any case the conclusion does not apply to the period from 1958 to 1966.

One implication of the finding that call features do influence yields is that the capital market is considerably less imperfect than Hess and Winn and various agencies regulating the issuance of corporate securities have implied. Another implication of this study is that, because of the great effect of the coupon rate on corporate bond yields, and the smaller but nonetheless significant influence of refunding deferments (particularly on high coupon bonds in periods of low yields), many commonly used series of corporate bond yields are inaccurate indicators of the state of the corporate bond market. Furthermore, many of the calculated yield spreads between new and seasoned corporate issues,[2] between corporates and governments, and between corporate bonds of different quality are not accurate. Similarly, both the shape of yield curves and the cyclical movements of interest rates on seasoned corporate bonds depend very heavily on the levels of coupons and deferments included in the series.

THE CALL OPTION AND CALL PROTECTION

The call option is the right of a borrowing company to redeem its debt prior to maturity. Virtually all long-term corporate bonds offered publicly in the postwar period have allowed for such calls during most if not all of the period for which the bonds were issued. The

[1] Arleigh P. Hess, Jr., and Willis J. Winn, *The Value of the Call Privilege*, University of Pennsylvania, 1962, p. 80.

[2] The average yield spread between the Moody series for new and seasoned Aa public utility bonds in the period 1952 through 1963 was 17.5 basis points, but the average new-seasoned spread was reduced to 9.7 basis points when measured between the yield on new issues and the yield on seasoned bonds with the same coupon rate as the new issues. See Joseph W. Conard and Mark W. Frankena, "The Yield Spread Between New and Seasoned Corporate Bonds, 1952–63," in *Essays on Interest Rates*, Vol. I, Jack M. Guttentag and Phillip Cagan, editors, New York, NBER, 1969, pp. 143–222.

first date on which the call option may be exercised may be immediately after issue or may be deferred a number of years, usually five. The indenture of each bond specifies a call price which the borrower must pay at the time of call. Normally this is about $103 to $108 per $100 of principal for call immediately following the date of issue and declines toward par by a fraction of a point each year as the bond approaches maturity.

Advantages of Callability to the Borrower

Callability has several advantages to the borrower. The most important is the ability to reduce interest costs if new issue yields decline substantially below the coupon rate on the outstanding issue. If the yield to maturity calculated from the call price is greater than the present new issue yield, the issuer gains by calling and refunding his debt.

When new issue yields are low, such interest savings may be realized simply by refunding a bond with an issue that is identical except that the coupon rate is lower. However, in cases where the company does not intend to retire an outstanding issue at maturity, it can replace the issue with one of longer maturity. In this case, the borrower can take advantage of a new issue interest rate that is low relative both to the coupon rate on its existing issue and to the yield that it expects to prevail at the time the outstanding issue would mature.

While most called bonds are replaced by ones which are identical, except in coupon and maturity, the call option also allows the borrower to replace its issue with a different type of bond or with stock, or to retire it completely. The outstanding bond may contain restrictive provisions in its indenture that limit additional borrowing, sale of assets, merger, or dividends. Such provisions may considerably hamper the operations of a company and, hence, justify call even when interest savings are not realized. Particularly after a merger, for example, it may be considered necessary to simplify the capital structure of the company by replacing a number of existing issues with a single new issue. Similarly, bonds may be called in connection with a reorganization by court order. Finally, changed circumstances of the company may call for a change in capital structure. The call option facilitates such change, and thus provides flexibility in the face of uncertainty.[3]

[3] The comments above assume that if there were no call option the borrower would not be able to repurchase its debt in the open market at less than the call

Disadvantages of Callability to the Lender

Callability has important disadvantages to the lender. If the investor is concerned with holding-period yields on marketable bonds, callable bonds are less attractive than call-protected ones because the price appreciation of the former is limited. Because of the threat of call when yields are low, the prices of callable bonds do not normally rise more than a point or two above the call price.[4] As a result, in the event of a fall in yields, the potential capital gains on callable bonds, particularly those which are immediately callable and have high coupons or low call prices, are limited.

For example, a 25-year bond with a coupon rate of 5.00 per cent might have a call price of 106. If this bond were selling at its call price, its yield to maturity would be about 4.60 per cent. In order for this bond to have a yield to maturity of 4.00 per cent, its market price would have to rise to 115¾; and to have a yield of 3.50 per cent, its price would have to rise to almost 125. Because the market price never rises appreciably above 106, almost 10 points in capital gains would be lost if market yields fell from 4.60 to 4.00 per cent and almost 20 points would be lost if yields fell to 3.50 per cent.

Beyond this, when callable bonds are actually called for redemption, the investing institution may be forced to reinvest at lower yields and incur the transaction cost of reinvestment.[5]

price. This is a reasonable assumption, for under conditions where it is profitable to call a bond the call price would be below the price that would prevail if there were no call option. In any case, it would be impossible for a borrower to buy back all its debt in the market at a reasonable cost. The bond price would rise to an exorbitant level as bonds were purchased. Similarly, in order to remove restrictions placed on the borrower by the indenture of a bond, it might be necessary to pay a high price to bondholders.

[4] This pertains to asked prices. Bid prices rise even less above call price.

[5] The cost to the investor attributable to actual call, over and above that due to the threat of call, depends on whether or not the investor would hold the bond to maturity regardless of its market price. If the bond is nonmarketable or if the investor holding a marketable bond plans to hold it to maturity regardless of market price, the investor loses a series of payments of coupon and principal when the bond is called, and receives the call price in its place. Assuming the investor reinvests at the prevailing, and presumably low, rate of interest on low coupon bonds for the remaining term of the old bond, the cost of call to the investor will be the present discounted value of (a) the difference in the coupons received, plus (b) the cost of reinvestment and the lost interest for the period, if any, during which cash is held, minus (c) the differ-

Regardless of whether interest rates fall or the bond is actually called, the option to call introduces uncertainty about the term of the investor's holdings and the continuity of future income. It thus limits the extent to which an institution can assure itself of a given flow of interest income in the future.

Call Features

The preceding summary of the benefits of the call option to borrowers and of protection against the option to lenders suggests the hypothesis underlying this study, that call provisions should influence yields to maturity on corporate bonds. To test this hypothesis it is necessary to consider the features of a bond that are relevant to the probability that the call option will be exercised, to the size of the benefits and costs of call when it is exercised, and to the extent to which capital gains are limited in periods of declining interest rates.

The primary variables determining the profitability of refunding to reduce interest costs are the coupon rate on the outstanding issue relative to that on new issues, the call price on the outstanding bond relative to the price received for the new issue, and the maturity of the bond called. The three characteristics of the outstanding bond that influence the profitability of refunding are, thus, coupon rate, call price, and maturity. A higher call price reduces the profitability of call by increasing the present cost of replacing the outstanding issue. A lower coupon or shorter maturity reduces the profitability of call by reducing the future benefits of replacing the outstanding debt, the first by reducing the annual benefit, the second by reducing the number of years over which the benefit is received.

In addition to the above characteristics of bonds that affect the probability of call, one would expect that the length of time during which call cannot be exercised would influence yields. There are too few completely noncallable bonds to test for a difference in yields between freely callable and noncallable issues. Nevertheless, in the period since 1957 a large proportion of new issues have been nonrefundable at lower interest cost, and a few noncallable for any reason,

ence between the call price received and the purchase price of the new bond. When looked at from the point of view of holding-period yields based on the market price of the bond in question, the cost of actual call would be simply the market price minus the call price.

until five years after issue.[6] On any bond with a coupon rate high enough and call price low enough that there is danger of call, a call deferment should reduce the yield.

One section of this paper examines the influence of the coupon rate on yields. Similar attention is not given to the influence of the call price for reasons noted in the text (see pp. 152–153). From a bond table it can be seen that an increase of two points in the call price of a 25-year high coupon bond has approximately the same effect on the yield to maturity calculated from call price, and hence on the profitability of call or the limitation of capital gains, as a reduction of ⅛ per cent in coupon rate with constant call price. As a result, yields should be influenced approximately the same amount by a two point difference in call price as by a ⅛ per cent difference in coupon rate in the other direction.

One may hypothesize that, if coupon and call price are held constant, bonds with longer maturity will carry higher yields in compensation for greater call risk. This effect, however, is likely to be small over the 20–40 year range covered by the bonds included in our data. The effect of callability on term structure is not studied.

THE EXERCISE OF THE CALL OPTION

In this section we examine the extent to which the call option has been exercised since 1951 and the reasons for calls. Although many types of bonds have been examined, data presented here cover publicly offered utility bonds rated A or better which were issued and called during 1951–63.

The exercise of the call option is dominated by the refunding motive, and the volume of redemptions depends largely on the level of new issue yields relative to previous peak new issue yields or coupon rates. The largest volume of redemptions took place in 1954–55, 1958, 1961, and 1962–63, when new issue yields fell below earlier peaks. Almost no calls were made during periods of high interest rates.

The first major period of refunding after the Treasury-Federal Reserve Accord of 1951 was the fifteen months from March 1954 through May 1955,[7] when new issue yields were low enough for profitable refunding of a large number of bonds that were issued during

[6] Between January 1957 and June 1966, 248 of the 711 new A, Aa, and Aaa utility bond issues had deferments.

[7] These are the offering dates of the new issues whose proceeds were used for refunding the issues called. The calls were actually made in May 1954 through July 1955.

April to September 1953, when yields were high. Table 3-1 shows the number of callable utility issues offered publicly in 1953 (the bottom number in each cell) and the number of these issues called for refunding in 1954–55 (upper number). None were called after 1955.

There were 72 freely callable utility bonds rated A or higher offered publicly in 1953. Of these, 32 were called in the following two years. Of the 42 bonds issued between April and September 1953, 30 were refunded. Part of the proceeds of between a third and a

TABLE 3-1. *Publicly Offered Utility Bonds Issued in 1953 and Called in 1954–55, by Quality Rating and Coupon Rate*

Coupon Rate	Aaa	Aa	A	Total
4 per cent and above	$\frac{0}{0}$	$\frac{2}{2}$	$\frac{15}{21}$	$\frac{17}{23}$
$3\frac{7}{8}$	$\frac{4}{4}$	$\frac{2}{3}$	$\frac{2}{4}$	$\frac{8}{11}$
$3\frac{3}{4}$	$\frac{1}{1}$	$\frac{2}{3}$	$\frac{0}{3}$	$\frac{3}{7}$
$3\frac{5}{8}$	$\frac{1}{2}$	$\frac{2}{4}$	$\frac{0}{8}$	$\frac{3}{14}$
$3\frac{1}{2}$ or lower	$\frac{1}{3}$	$\frac{0}{11}$	$\frac{0}{3}$	$\frac{1}{17}$
Total	$\frac{7}{10}$	$\frac{8}{23}$	$\frac{17}{39}$	$\frac{32}{72}$

NOTE: The bottom number in each cell shows the number of callable utility issues offered publicly in 1953; the upper number shows the number of these issues called for refunding in 1954-55. None were called after 1955.

SOURCE: Data from *Moody's Bond Survey* (weekly) and *Moody's Bond Record* (monthly), Moody's Investors Service, N. Y.

fourth of the A-Aaa utility issues offered publicly in the period from March 1954 to May 1955 were used for refunding.

Because of the limited variability of call prices and maturities and the absence of call deferments on all but one of the 1953 issues, the two most important variables determining whether a bond could be refunded profitably were the coupon rate and quality rating. Quality rating is important because it influences the rate at which new issues can be sold. The higher the coupon rate and the quality, the larger was the proportion of the callable bonds actually called. For example, of the 23 bonds with coupons of 4 per cent or greater, 17 were called; all those not called were rated A. Of the 17 bonds with coupons of 3½ per cent or lower, only 1 was called and it was rated Aaa.[8]

Only four of the bonds issued in 1954 through 1956 were subse-

[8] Inclusion of bonds issued in 1951 and 1952 does not alter this general tendency.

quently called. All of these were called at a loss in connection with mergers that made it necessary to replace the debt of one of the companies involved.

In 1957, yields on new issues reached their highest level in many years. It would have been profitable to refund a great many of these bonds in early 1958 when rates were considerably lower, but in fact refunding was light. Only 7 of the 78 callable utility bonds issued publicly in 1957 and rated A or better were refunded. The reason for the extremely small number of refundings in 1958 despite the low level of new issue yields was the sudden unexpected rise in yields after June. It is clear from the contemporary financial press that a substantial further decline in new issue yields was expected and that borrowers were therefore holding off on refunding until maximum interest savings could be made. The market reversal came so quickly that a number of companies that had already announced refundings for the third quarter of 1958 were forced to abandon their plans.

As in the period from 1954 to 1956, none of the bonds issued in 1958 had a coupon high enough to justify refunding later. The only bond called was refunded at a loss in terms of interest cost in connection with a merger in 1962.

Five bonds with coupons of 5⅜ per cent or higher were refunded in the first half of 1961, but it was not until 1962–63 that refunding volume again reached large proportions. Of 105 callable bonds with coupons of 5 per cent or higher issued in 1957–61 and still outstanding, 46 were called during 1962–63. Two bonds with coupons below 5 per cent were called at a loss in connection with a merger.

Most high grade public utility bond refundings were thus designed to reduce interest costs. In many other cases the new bond issued to replace the refunded one carried a longer maturity, thus assuring low interest costs for a longer period. Considering the upward trend in interest rates through the 1950's, the ability of companies to make such advance refundings in 1954–55 and 1958 clearly reduced their interest costs appreciably. Similar conclusions apply to lower grade issues, and to industrial, railroad, and finance company obligations.

Calculation of interest savings that have been realized from refunding is complicated by the fact that outlays and savings occur at different points in time. Considering bond refunding as a risk-free investment by the firm, Bowlin[9] has made a calculation of the rates of return earned on forty bond refundings by public utilities in 1962

[9] Oswald D. Bowlin, "The Refunding Decision: Another Special Case in Capital Budgeting," *Journal of Finance,* March 1966, pp. 66–67.

and 1963. The procedure used was to discount after-tax net interest savings (for each year until the maturity date of the refunded bond) at a rate that equates their present value with the net cash investment. The range of rates of return on the investment in refunding was from 3.6 to 43.4 per cent (or 26.7 per cent on the second highest bond) and the interquartile range was 9.1 to 14.6 per cent. Because the after-tax cost of funds on refunding bonds was about 2 to 2½ per cent, none of the forty bonds was refunded at a loss and some involved very high rates of return. However, Bowlin's rate of return calculations do not indicate the magnitude of interest savings relative to total interest costs and, hence, do not shed much light on the value of the call option. We made a calculation of the difference between (a) the yield to maturity on the refunded bond calculated from the call price, which is the gross return to the company from buying back its own bond, and (b) the yield to maturity on the refunding bond calculated from the price received from the underwriter, which is the cost of funds to the company. We then averaged these yield differences over the 85 refundings of utility bonds in our sample for which the necessary data were available. The average was 50 basis points.[10]

Some refundings were for reasons other than to reduce interest costs. One reason was to refund the debt of a newly acquired subsidiary company following a consolidation or merger in order to remove restrictions from the bond indenture or to simplify and consolidate debt. In several cases such refundings raised interest costs. Refundings also were used to remove restrictive clauses or consolidate debt without any connection with mergers.[11]

[10] This measure of interest savings is not entirely satisfactory because it involves averaging over a nonlinear price-yield relationship and using two different discount rates. Moreover, it does not consider costs associated with the refunding other than the call premium on the outstanding issue and underwriting spread on the new issue, and it does not include the effect of taxation of increased profits.

Frank C. Jen and James E. Wert have estimated the difference between the offering yield and realized yield on funds invested in callable utility bonds issued and called during 1956–64 and the effect of call deferments on realized yields in 1956–66. See their articles, "The Effect of Call Risk on Corporate Bond Yields," *Journal of Finance*, December 1967, and "The Deferred Call Provision and Corporate Bond Yields," *Journal of Financial and Quantitative Analysis*, June 1968.

[11] In 1955–56, the Baltimore and Ohio Railroad consolidated all of the refundable mortgages of its divisional companies into a single systemwide mortgage. A company official at the time announced that this removed restrictive provisions on the railroad's dividend policy, expressed hopes that it would raise

The call option has also been used to reduce bond indebtedness pending liquidation of the firm, to retire debt with funds obtained from property condemnation settlements, and to alter a firm's capital structure. In the latter case, marketable bonds have been replaced with private placements, with bank loans, and with common stock.

These diverse reasons for exercising the call option demonstrate that the financial flexibility provided by free callability is valuable, even in the absence of expectations of declining interest rates.

THE INFLUENCE OF COUPON RATE ON SEASONED PUBLIC UTILITY BOND YIELDS

This section analyzes the effect of coupon rate on seasoned public utility bond yields. The yield series used were constructed for this project. They cover seasoned long-term callable Aa-Aaa public utility bonds during 1957–67, broken down by coupon rate. The data are shown in Appendix Table 3-A.

The Historical Record, January 1957 to October 1967

Chart 3-1 presents time series on the yield spreads between bonds with various coupon rates and bonds with a coupon rate of 2¾ to 2⅞ per cent. These spreads are large and variable; the spread for the 5 per cent coupon series averages 32 basis points and ranges up to 100 basis points. The spread is larger the higher the coupon rate. This relationship can be seen more directly in Chart 3-2, which presents cross sections relating spread to coupon rate on specified dates.

Chart 3-1 also demonstrates that spreads increase as the level of yields declines. This relationship can be seen more directly in Chart 3-3, where the spread for bonds with a coupon rate is plotted against the yield on bonds with a 2¾–2⅞ per cent coupon.

Hypotheses to Explain the Influence of Coupon Rate on Yields

The Call Option.

One reason for the coupon rate to influence yield is that, because of the threat of call, bonds do not sell at more than a point or two above

the company's credit rating, and estimated that it would also save the company an annual $2.7 million in interest payments on the $345 million debt.

CHART 3–1. Yield Differentials, Callable Aa-Aaa Utility Bonds With Specified Coupon Rates Less Bonds With Coupons of $2\frac{3}{4}$ to $2\frac{7}{8}$ Per Cent, 1957–67

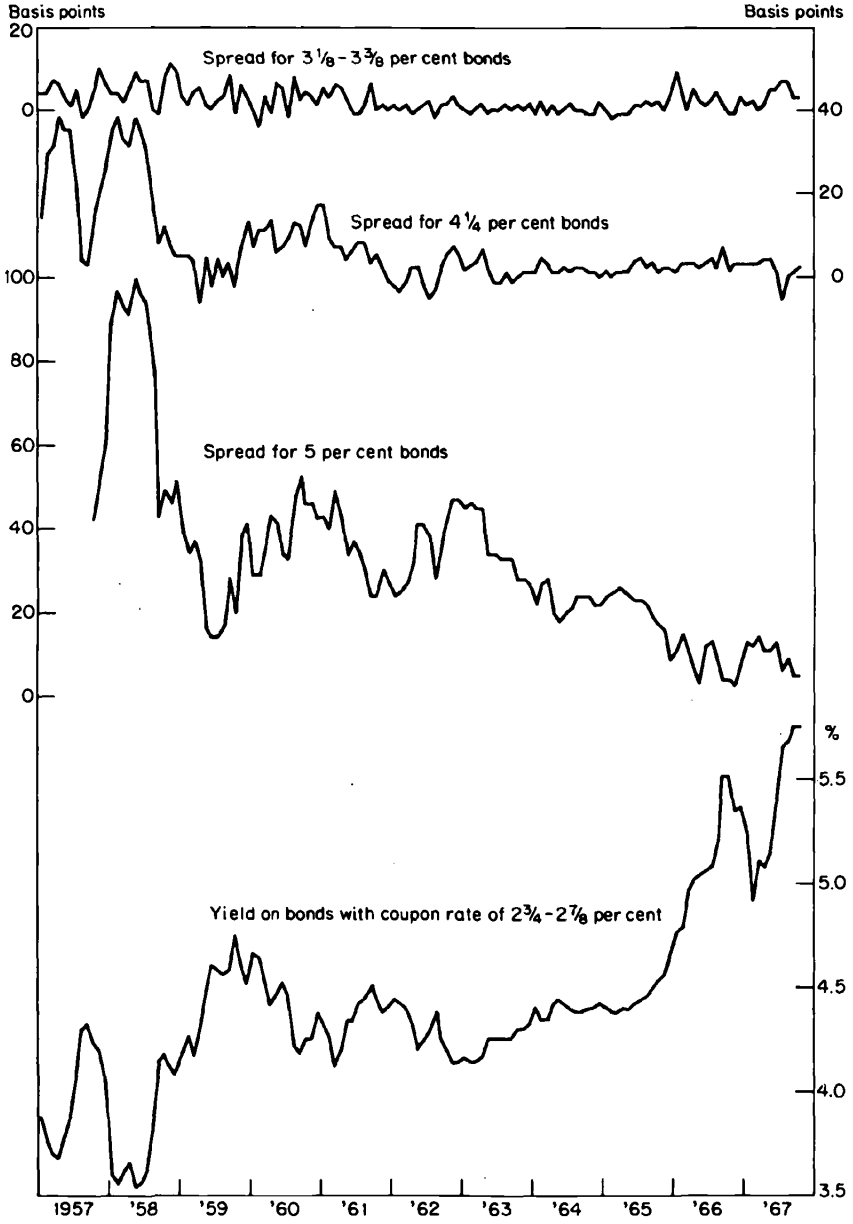


CHART 3–2. Yield Differentials, Callable Aa-Aaa Utility Bonds With Specified Coupon Rates Less Bonds With Coupons of 2¾ to 2⅞ Per Cent, Selected Months

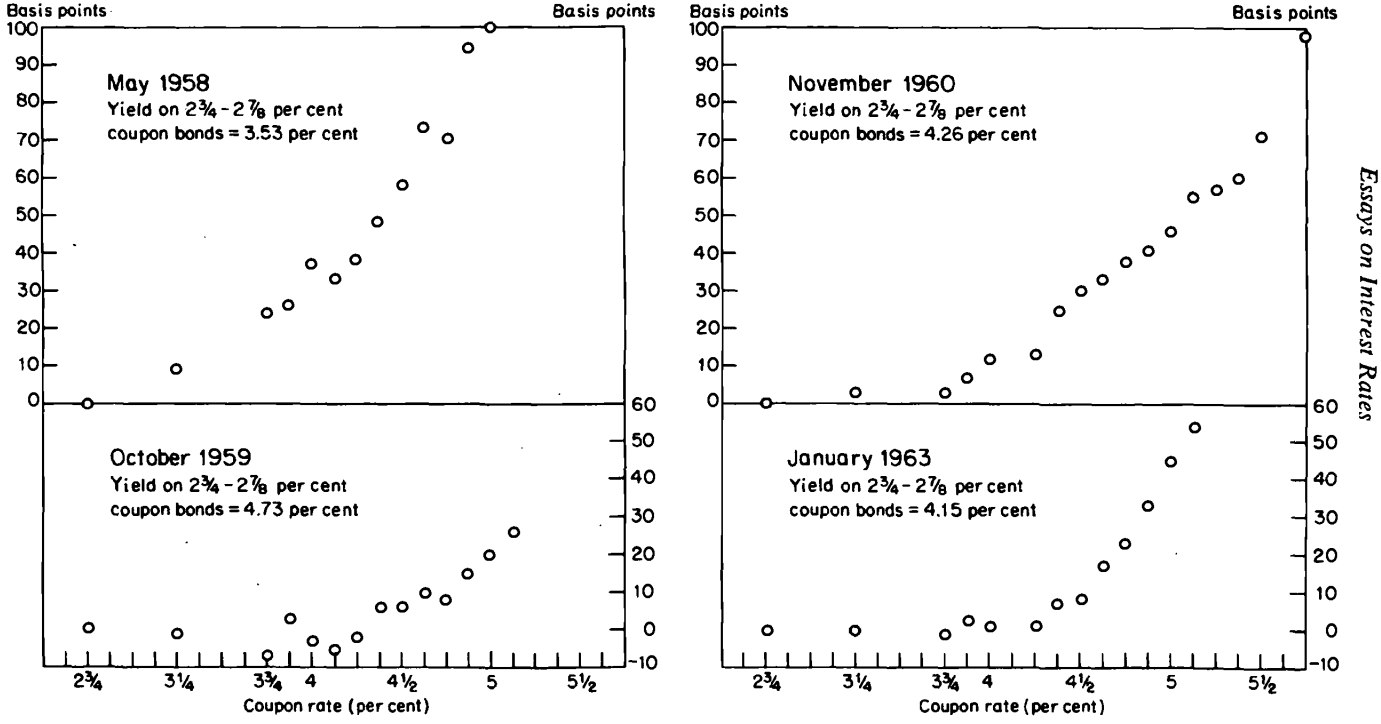
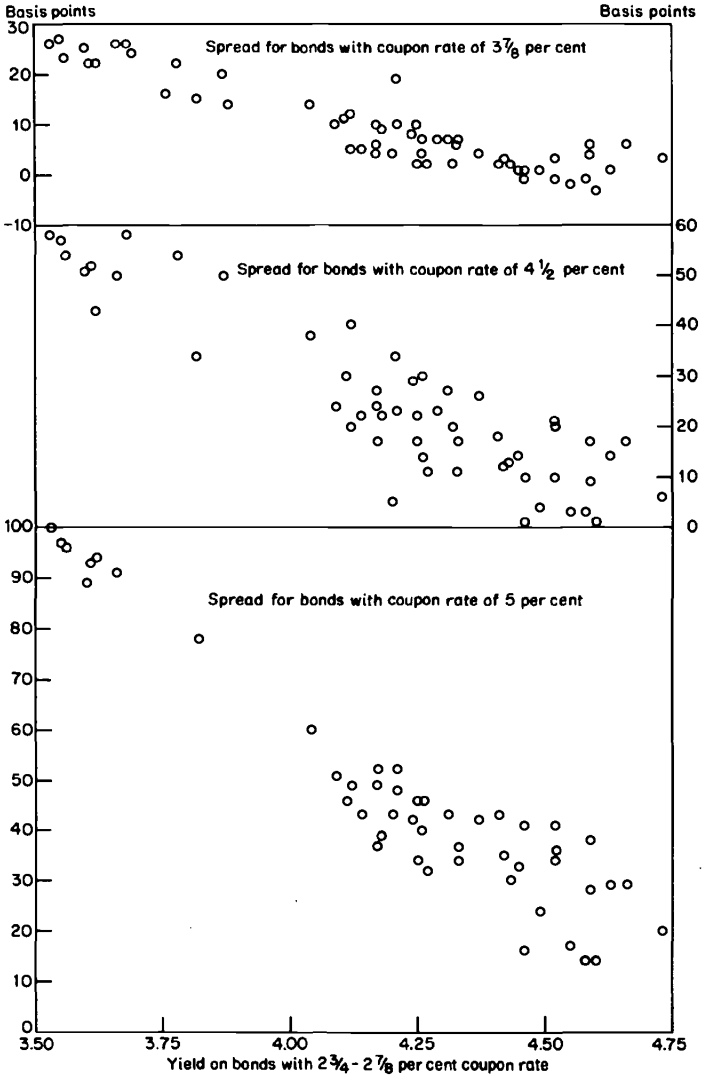


CHART 3–3. Yield Differentials, Callable Aa-Aaa Utility Bonds With Specified Coupon Rates Less Bonds With Coupons of 2¾ to 2⅞ Per Cent, January 1957–September 1961



their call prices. Because of the practice of raising the call price on new issues only slightly as the coupon rate is increased, at any given yield to maturity, higher coupon bonds sell closer to call price, and

hence they reach call price first as yields decline. After the price of a higher coupon bond reaches the call price, any further fall in the yield on the low coupon bond results in an equal increase in the spread between the yields of the two bonds, and the yield spread would be larger the greater the coupon on the high coupon bond.

In addition, high coupon bonds are less attractive than low coupon bonds because, if interest rates fall in the future, higher coupon bonds will have limited capital gains and may be called. We may hypothesize that this would lead investors to requiré higher yields to maturity on higher coupon bonds even before their price appreciation has been stopped by the call price.

Miscellaneous Reasons for a Relationship of Yield to Coupon Rate.

Apart from the call option, several reasons, most of them relatively minor, can be suggested to explain why investors might prefer low coupon bonds. Most obvious is the effect of differing tax treatment of different forms of income. Investors might be expected to prefer low coupon bonds because they sell at a discount and a larger part of any given before-tax yield to maturity is in the form of capital gains. A before-tax yield advantage would therefore be required on high coupon bonds to attract buyers.

The tax advantage of low coupon bonds would affect yield relationships only to the extent that the market for corporate bonds is dominated by investors who benefit from the substitution of capital gains for ordinary income. In fact, consideration of the tax treatment of the major investors in corporate bonds suggests that tax considerations are relatively unimportant. The corporate bond market is dominated by institutional investors, particularly life insurance companies, corporate pension funds, and state and local retirement funds. The investment income of corporate pension funds and state and local retirement funds is tax free, and hence these institutions would receive no tax advantage by holding lower coupon bonds. Until 1963, the price appreciation on discount bonds did not receive more favorable tax treatment than coupon income for life insurance companies.[12]

[12] Taxable income of life insurance companies is subject to regular corporation income taxation. Until 1963, life insurance companies were required to accrue market discounts on bonds and treat this as ordinary income for tax purposes. Since 1963 market discounts realized by insurance companies have been accorded capital gains treatment. The excess of net long-term capital

Moreover, to the extent that tax factors affect the yield differential between bonds with different coupon rates, the spread should be larger the higher the general level of yields, since the advantage of the lower coupon bonds would be greatest when their prices were lowest. In fact, one finds the opposite relation between the size of spreads and the level of yields. Tax considerations thus appear to play a negligible role in determining yield differentials between bonds with different coupon rates.

A paper by Durand and another by Durand and Winn[13] offer a variety of alleged advantages of low coupon bonds. Macaulay[14] has pointed out that a low coupon bond has a longer "duration" than a high coupon bond with the same number of years to maturity. Hickman,[15] in developing the idea of duration as a substitute for maturity,

gains over net short-term capital loss is subject to a tax rate of 25 per cent. See R. L. Denney, A. P. Rua, and R. J. Schoen, *Federal Income Taxation of Insurance Companies,* 2nd ed., New York, 1966, pp. 5.17–18, 6.2–7.

[13] David Durand, *Basic Yields of Corporate Bonds, 1900–1942,* New York, NBER, 1942, especially pp. 20–21; and David Durand and Willis J. Winn, *Basic Yields on Bonds, 1926–1947: Their Measurement and Pattern.* New York, NBER, 1947, especially Addendum pp. 31–40.

The alleged advantages are: (1) It is said that accounting procedures, sometimes adopted by legal requirement, may prevent amortization of premiums on high coupon bonds and hence force the recording of price premiums as capital losses when such bonds mature. In contrast, Sidney Homer has suggested to me that some institutional investors are attracted to high coupon bonds because the management is rated by the average current income, which is based simply on coupon receipts excluding discounts on low coupon bonds. (2) The mathematical relation between yield, price, and the coupon rate for a bond of given maturity will cause the price increase on low coupon bonds to be greater in percentage terms than that on high coupon bonds if both of their yields start at the same level and fall by the same amount, thus making the low coupon bond preferable if yields are expected to fall. However, this effect is bound to be very small. (3) It is said that "a high coupon bond, which must be purchased at a substantial premium, is far more likely to decline drastically in price than a low coupon bond, which is purchased at a small premium; traders seem to feel that in a declining market, prices fall fairly freely until they approach par, at which point they meet resistance to further decline" (Durand and Winn, *ibid.,* p. 35). This assertion has not been verified. (4) There is said to be an irrational preference for low priced and hence low coupon bonds merely because they are low priced and thought to be bargains.

[14] Frederick R. Macaulay, *Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields and Stock Prices in the United States Since 1856,* New York, NBER, 1938, pp. 44–53.

[15] W. Braddock Hickman, "The Term Structure of Interest Rates, An Exploratory Analysis," NBER, unpublished manuscript, 1942, Chapter 5.

argues that higher coupon bonds should sell at lower yields to maturity if the term structure of rates is upward sloping, for the same reasons that short maturity bonds carry lower yields than long maturity bonds with the same coupon.

Empirical Evidence: Multiple Regressions

The data listed in Appendix Table 3-A and presented graphically in Charts 3-1 through 3-3 were analyzed using multiple regressions. In each case, the spread between the yield of the higher coupon bonds and the average yield on the bonds with a coupon rate of 2¾ to 2⅞ per cent was used as the dependent variable whose behavior was to be explained. The 2¾ to 2⅞ per cent coupon rate is low enough that during the period under study these bonds had complete call protection. Testing was limited primarily to regression models derived from the call and capital gains hypotheses. The basic hypothesis tested was that the spread between the yields of bonds with different coupon rates depends on factors which influence the profitability of call or expectations about future movements in interest rates.

Variables for Multiple Regressions.

COUPON RATE. One independent variable should be a measure of call protection. This could be both the coupon rate and the call price. The call price is not practical as a separate variable, however, since it is set more or less equal to the offering price (usually par) plus the coupon rate. Because of this practice, there is very little independent variability in the call price: a higher call price will be associated with a higher coupon, and therefore with a higher yield, despite the hypothesis that, ceteris paribus, a higher call price leads to a lower yield.

There is a variable that reflects the call protection of both the coupon rate and the call price. This is the yield to maturity on a bond when it is purchased at the call price. Either an increase in coupon rate or a reduction in call price will reduce call protection, and this will be reflected in an increase in the yield to maturity calculated from the call price.

Because of the large amount of work required to calculate the yield to maturity from call price for all observations of all bonds used, only the coupon rate was used in the regressions as an explanatory variable

measuring call protection. Since call prices tend to be higher on bonds with higher coupon rates, omission of the call price gives a downward bias to estimates of the influence of coupon rate. In Chart 3-2 we have already presented graphical evidence of the influence of the coupon rate on yields.

LEVEL OF YIELDS. A second variable which should influence spreads is the level of yields. In Chart 3-3, the spreads show a marked tendency to increase as the level of yields is decreased, even when a further price increase on the higher coupon bond has not yet been stopped by the call price.

The new issue yield is particularly relevant here because the lower it is, the greater the probability that it will fall to a level that will justify refunding. The yield on seasoned bonds with a low coupon is relevant because the lower it is, the greater the probability that it will fall to the level where price appreciation on higher coupon bonds will be halted. We used the level of yields on new issues as an independent variable.[16]

[16] The simple correlation coefficient between the new issue and seasoned yields is .78. If the yield on seasoned issues is used in the multiple regression, the R^2 and the statistical significance of the level of yields variable are increased. However, econometric considerations argue against the use of the yield on seasoned bonds with a 2¾ to 2⅞ per cent coupon rate as an independent variable, because it is used in computing the yield spread that we are seeking to explain. Because any errors of measurement or random movements in the low coupon seasoned yield series have already been transmitted to the dependent variable, part of its explanatory power in a multiple regression would be spurious and its regression coefficient would be biased.

The problem of spurious correlation and bias should be handled by transforming the regression equation and then using a consistent technique for estimating the parameters. Assume that we start with the simplified model where the dependent variable is the yield spread between seasoned bonds with a high coupon rate and bonds with a coupon rate of 2¾ to 2⅞ per cent and the only independent variable is the yield on seasoned bonds with a coupon rate of 2¾ to 2⅞ per cent. Then the regression model is:

$$(Y - X) = a + bX + E,$$

where $Y =$ the yield on high coupon seasoned bonds; $X =$ the yield on seasoned bonds with a coupon rate of 2¾ to 2⅞ per cent; and $E =$ the error term. If we add X to each side of the equation, we have:

$$Y = a + (1 + b)\, X + E^*.$$

Direct estimation of this by ordinary least squares would introduce simultaneous equations bias. Using a consistent method of estimation, regressing Y on a con-

The new issue series appears to be a more sensitive indicator of conditions in the capital markets.[17] The series used was compiled by Sidney Homer and covers newly issued callable Aa public utilities. This series is shown in Appendix Table 3-C.

CHANGE OF YIELDS. A third variable that might influence the size of the spread is the direction and rate of change of yields. Expectations concerning changes in interest rates will influence expectations of call and capital gains. On the hypothesis that yields are expected to continue moving in the direction they have been moved in the recent past, ceteris paribus, the yield spread due to coupon difference would be higher when interest rates have been falling.[18]

As in the case of the level of yields, a choice must be made between alternative change-in-yield variables. Because of the findings of the Conard study with regard to the primacy of the new issue market, we used the change in new issue yields.[19]

After some testing, it was decided to use a weighted average of changes in yields over the past six months. The weights were .75 for the change in yield over the past month, $(.75)^2$ for the month before that, and so forth back to $(.75)^6$ for the sixth month. This geometrically declining pattern of weights was chosen somewhat arbitrarily on the presumption that it would provide a reasonable index of past yield changes in which a greater weight is given to recent changes.[20]

stant and X, the coefficient of X will be an estimate of $(1 + b)$. The hypothesis suggests that $0 < (1 + b) < 1$.

Use of the level of yields on new issues as an independent variable introduces a similar problem of spurious correlation and bias. The coupon rates of new issues have been high enough that new issue yields are influenced by the call option. As a result, the new issue yield depends on the yield spread due to coupon differences, which is the dependent variable in the regression. This introduces simultaneous equations bias.

[17] Joseph W. Conard and Mark W. Frankena, *op. cit.*

[18] Rather than assume such a theory of expectations, one might assume the validity of the expectations theory of term structure and derive the expected change in interest rates from the yield curve. That was not done here.

[19] Simultaneous equations bias arises here again for the same reason it appears in the coefficient of the level of new issue yields. Changes in the yield on low coupon seasoned bonds proved to have more explanatory power but this is probably due to the more erratic nature of new issue rates and to spurious correlation.

[20] An alternative would be to estimate the weights using the Almon-Lagrange interpolation technique, but the reliability of the derived lag structure would

TIME TREND. Observation of the time series in Chart 3-1 suggests that there has been a downward trend in the size of yield spreads associated with differences in coupon rates. The declining trend in spreads is not due entirely to the upward trend in yield levels with constant regression coefficients. Chart 3-4 reproduces Chart 3-3 for 4½ per cent coupon bonds with the addition of observations for the period from October 1961 through October 1967. It can be seen that the spreads for the later period (represented by X's) are substantially lower than those for the earlier period (represented by circles) at any yield on the low coupon bonds. Because of this, a time trend variable has been included in the equation. This variable is given a value of 1 for the first month's observation, 2 for the second, and so forth. The assumption of a linear time trend is of course an oversimplification.[21] The shift was probably somewhat greater in 1961 than in the other years. By 1966, spreads had reached such a low level that continued upward revision in the expected or "normal" level of yields could not cause much further reduction. As a result, at the coupon rates used in this study, one should not project the time beyond the period considered in the regressions.

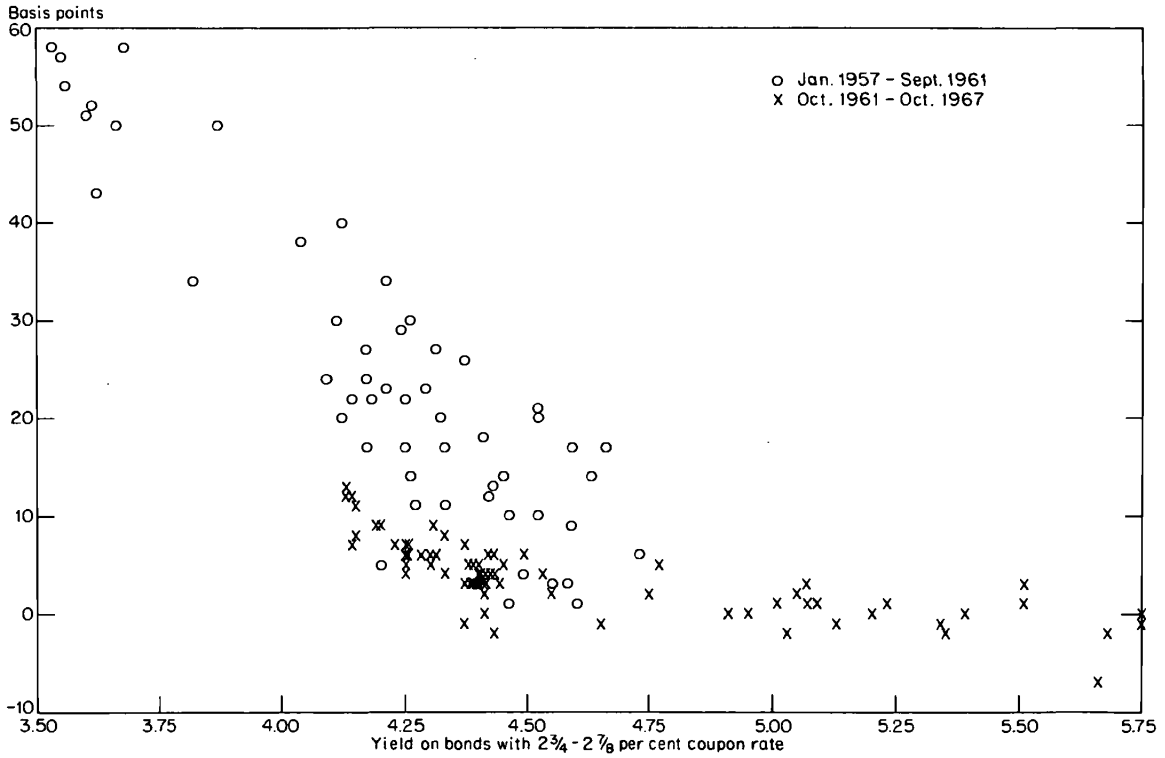
Two explanations for this reduction in spreads can be suggested. The first is that there was an upward revision in the expected "normal" level of interest rates which reduced the value of call protection. If interest rates in the 1960's were no longer expected to fall to the lows that were anticipated in the 1950's, then the danger of refunding and the expected limitation of capital gains in the event of future price rises would have been reduced.

A second reason for the trend in the yield spread has been suggested by Sidney Homer. He emphasizes the role of the supply and demand for funds in determining yield spreads. On the supply side, secular growth of large institutional investors has produced an increase in competition for higher yielding investments and a tendency for yield spreads of many sorts to be reduced, including those between bonds with different coupons, bonds with different quality ratings, new and seasoned issues, and corporates and governments. He also argues that from 1961 through 1964 there was a very light volume of new corporate public offerings,

be too low for this method to be a practical improvement. See S. Almon, "The Distributed Lag between Capital Appropriations and Expenditures," *Econometrica,* January 1965, pp. 178–196.

[21] The time trend was also included as a quadratic because it seemed likely that the trend was greater in the earlier period when spreads were large. An increase in the correlation coefficients and reduction in the autocorrelation of residuals suggest that this is an improvement over the linear trend variable.

CHART 3–4. Yield Differentials on Callable Aa-Aaa Utility Bonds: Bonds With Coupon Rate of 4½ Per Cent Less Bonds With Coupon Rates of 2¾ to 2⅞ Per Cent, 1957–67



especially after allowance was made for refundings, and a cumulative drought developed. Because new issues during part of this period did not have high coupons, and because many outstanding high coupon bonds were called, the relative supply of high coupon bonds declined during 1962–63. Further, the volume of long-term governments, which are closer substitutes for low coupon than high coupon corporate bonds because of their call protection, increased. Homer believes that these changes in supply and demand factors explain the decline in the spread caused by coupon differences, particularly during the 1961–65 period.

VOLUME OF NEW CORPORATE ISSUES. A partial test of the Homer hypothesis can be made by including the volume of new corporate bonds as an independent variable in the regression equation. On the basis of our hypotheses, we should expect that, if the volume variable influences the size of the spread, it would have a positive regression coefficient. Tests of alternative measures indicated that the volume of publicly offered issues for the three months preceding the month of observation gave the best results.[22]

REGRESSIONS. Two types of regression equations were estimated. The first covered all the bonds in the sample and included the coupon rate as an independent variable. In the second set, a separate regression was run for bonds with each coupon rate, and consequently the coupon rate was not used as an independent variable.

In the first of these regressions, a linear relation between the natural logarithms of the data was used.[23] The logarithmic transformation of the data was used because our hypothesis and other analysis suggested that a purely linear relation was inappropriate because the effect that any given difference in the coupon rate or in the level of yields has on the spread depends on both the level of the coupon rate and the level of yields. A full logarithmic transformation of the data makes the first derivative of the spread with respect to each independent variable depend on the level of each of the independent variables. With two

[22] Inclusion of privately placed issues or the issues of one month more or less did not make much difference in the results.

[23] Because it is impossible to take the logarithm of a negative number, 1.00 per cent (100 basis points) was added to the spread and the change-in-yield variable at each observation before taking the logarithm in order to make all observations positive.

independent variables, the relation $\log y = c + b_1 \log x_1 + b_2 \log x_2$ implies a relation between the untransformed data of the form

$$y = a x_1^{b_1} x_2^{b_2}.$$

The first regression was run for all observations from January 1957 through April 1966 for bonds with coupon rates from 3¾ through 5¾ per cent. Table 3-2 provides a summary of the variables used and the results of the regression.[24]

TABLE 3-2. *Regression of Yield Spread on Explanatory Variables, 3¾ to 5¾ Per Cent Coupon Bonds, 1957–66*

Variable	*b* Coefficient	*t* Value
Constant	−.679	−10.77
X_1	1.141	55.70
X_2	−.492	−12.65
X_3	−.079	−5.87
X_4	−.0021	−30.77

NOTE: The number of observations = 1,294; the standard error of estimate = .077; R^2 = .779; F statistic for R^2 = 1,134.37; dependent variable is the logarithm of 1.00 plus the yield spread over bonds with a coupon of 2 3/4 to 2 7/8 per cent; X_1 is the logarithm of the coupon rate; X_2 is the logarithm of the level of the new issue yield; X_3 is the logarithm of 1.00 plus the weighted average of change of new issue yields; X_4 is the logarithm of e^t, where t is the time trend, or simply t since $\log (e^t) = t$.

All regression coefficients have the signs hypothesized and are statistically significant at the .01 level. Approximately 78 per cent of the variance of the dependent variable is "explained" by the regression. It should be noted that no measure for volume of new issues was included in this regression.

Regressions were also run separately at each coupon rate for the higher coupon bonds, again using all observations available between January 1957 and April 1966. This time no logarithmic transformation of the data was made, but the level of new issue yields was included as a quadratic term. There was, therefore, one independent variable for the new issue yield and another for its square. The form of the regression equation was linear apart from this transformation. Table

[24] To provide a better test for the remaining observations, it might be desirable to run the same regression omitting all observations where the market price of the high coupon bond was close to or held at the call price.

3-3 describes the symbols used in the regression equations and gives the results.

In these regressions, the independent variables account for between 81 and 89 per cent of the variance in the yield spread. Moreover, all regression coefficients have the signs required by our hypotheses. With the exception of the change-in-yield variable in the first and last regressions, all variables are significant at the .01 level.[25]

Although these results generally support the hypotheses, the coefficient of the time trend seems implausibly large. Our interpretation of the time trend is primarily that it takes account of the upward revision in the expected "normal" and cyclical minimum levels of yields.

ZERO SPREADS. It is of some interest to know the yield level, if any, at which the yield spread for an intermediate or high coupon bond approaches zero. On the basis of our hypothesis, there is no reason to expect that the yield spread on higher coupon bonds should ever become zero as long as a fall in yields is anticipated, because the lower coupon bonds would still have an advantage in terms of call protection and capital gains potential. However, in the past decade spreads did approach to within a very few basis points of zero at a time when yields on the lower coupon bonds rose to the level of the coupon rate on the higher coupon bond and the higher coupon bond was therefore selling below par. This can be seen in Charts 3-2 and 3-4.

LIMITATIONS OF THE REGRESSION RESULTS. A statistical problem encountered in the regressions which we have discussed is autocorrelation among errors. According to the Durbin-Watson statistics for the regressions in Table 3-3, all have significant positive first-order serial correlation of the residuals. Autocorrelation alone does not introduce a bias into the estimated regression coefficients as long as the assumptions of the least squares statistical procedure hold. However, the significance levels of the regression coefficients are lower than is indicated by the calculated t values. The presence of autocorrelation also suggests that some errors have been made in the specification of the regression equation.

The reliability of the individual regression coefficients is further weakened by the likelihood of multicollinearity among the independent variables because of their related cycles and trends.

[25] Because of the autocorrelated residuals, however, the true significance levels for the regression coefficients are below those indicated by the t values.

TABLE 3-3. *Regression of Yield Spread on Explanatory Variables, for Bonds With Given Coupon Rates*

Variable	5 Per Cent		$4\frac{7}{8}$ Per Cent		$4\frac{3}{4}$ Per Cent		$4\frac{5}{8}$ Per Cent		$4\frac{1}{2}$ Per Cent	
	Reg. Coef.	t value	Reg. Coef.	t value	Reg. Coef.	t value	Reg. Coef.	t value	Reg. Coef.	t value
Constant	9.507	8.197	8.999	8.308	4.518	3.664	7.160	7.759	4.871	4.433
X_1	−3.647	−7.262	−3.521	−7.507	−1.686	−3.165	−2.928	−7.327	−1.922	−4.047
X_2	.363	6.673	.357	7.031	.166	2.885	.307	7.100	.195	3.814
X_3	−.086	−1.582	−.102	−1.996	−.133	−2.362	−.182	−4.179	−.059	−1.171
X_4	.091	4.927	.104	6.024	.120	6.120	.116	7.911	.108	6.163
X_5	−.0033	−12.763	−.0037	−15.706	−.0037	−15.314	−.0030	−14.890	−.0031	−13.983
Number of observations		103		104		111		104		109
Mean of Y		.363		.299		.232		.181		.146
Standard error of estimate		.071		.067		.077		.057		.069
R^2		.876		.887		.828		.879		.808
Durbin–Watson statistic[a]		.877		.906		.700		.867		.571

NOTE: The dependent variable is the yield spread over bonds with a coupon of $2\frac{3}{4}$ to $2\frac{7}{8}$ per cent; X_1 is the level of the new issue yield; X_2 is the square of the level of the new issue yield, $(X_1)^2$; X_3 is the weighted average of change in the new issue yield; X_4 is the volume of publicly offered new corporate bonds; X_5 is the time trend.

[a]In computing the Durbin-Watson statistic, all first differences were taken between residuals for observations in consecutive months. Whenever an observation was missing, the corresponding first differences were omitted.

Finally, because of the inclusion of a time trend and nonlinear terms, the regression equations we have estimated do not permit extrapolation beyond the limits of the observations used in estimation.

Despite these problems all the results appear consistent with theoretical considerations of how call features should affect yields. Any gains from more exact specification of the relationships do not seem to merit the additional costs involved.

THE INFLUENCE OF CALL DEFERMENTS ON PUBLIC UTILITY BOND YIELDS[26]

Opinions and Policies of Regulatory Commissions and the Financial Community

The Securities and Exchange Commission, the Federal Power Commission, and the public service commissions of the various states regulate the sale of bonds by utility companies. Before refunding deferments came into widespread use in 1956, the SEC developed a policy designed to prevent restrictions on callability. This policy, which was in effect throughout the period under study, required that "securities be redeemable at the option of the issuer at any time upon reasonable notice and the payment of a reasonable redemption premium, if any." The purpose of this provision was "to assure that public utility companies shall be in a position, if money rates decrease materially, to refund their bonds" and thus "to ensure economies in the raising of capital." In addition to denying the use of refunding deferments, they ruled that call protection could not be provided by setting a very high call price or setting a low coupon rate and selling at a discount.[27]

[26] A study of this problem was made independently by Frank C. Jen and James E. Wert and reported in "The Value of the Deferred Call Privilege," *National Banking Review,* March 1966, pp. 369–378. They studied the period 1960–64 and arrived at the same conclusions reached here. See also Gordon Pye, "The Value of Call Deferment on a Bond: Some Empirical Results," *Journal of Finance,* December 1967, pp. 623–636.

[27] "The working policy of the Commission has been that the initial redemption price shall not exceed the sum of the initial public offering price plus the coupon rate on the bonds." SEC, *23rd Annual Report, Fiscal Year Ending June 30, 1957,* Washington, D.C., 1958, p. 142. Substantially the same statements are contained in every annual report through the present. See *31st Annual Report, Fiscal Year Ending June 30, 1965,* p. 91. The FPC has taken substantially the same position, denying requests for authorization of refunding deferments

In opposing restrictions on the call option, the SEC and FPC argue that the potential benefits of refunding outweigh whatever increase in the cost of funds is attributable to free callability.

The SEC stated that "issues of immediately refundable bonds have, on the whole, not been penalized in the market place as compared with those users which accepted refunding restriction."[28] As support for its position, the SEC has cited evidence on new issue yields, on the average number of underwriter bids received at competitive bidding, and on the success with which issues were marketed by the underwriter. The SEC argues that its position is supported by the study of offering yields during 1926–59 made by Hess and Winn, which found that only in the second half of 1959 was there any difference in yields on freely callable bonds and those carrying refunding deferments.[29] Moreover, the SEC reports that "studies made by the Commission's staff . . . with respect to electric and gas utility bond issues sold at competitive bidding . . . indicated that the presence or absence of a restriction on free refundability has not affected the number of bids received by an issuer at competitive bidding or the ability of the winning bidder to market the bonds."[30]

Despite the denial of deferments by the SEC and FPC since 1957, about a third of the public offerings of utility bonds (and a larger proportion of industrial issues and private placements) have had refunding deferments. This indicates that a large number of corporate borrowers

on new issues. Commissions in the states have in general issued similar statements against deferments, but in practice many have permitted them.

[28] SEC, *28th Annual Report*, p. 93. The FPC similarly stated in 1957 that, despite the value of the call option to the borrower, which would justify payment of a higher cost for funds, "our experience to date has not shown a material difference in the cost of money, on a current basis, of comparable issues with a limitation on the right of redemption and those without." *Public Utility Reports*, 19 PUR 3d, 1957, p. 187, re Puget Sound Power and Light Co.

[29] "These differences, indicating somewhat lower interest costs on bonds having refunding restrictions, were found by the Wharton School (i.e., Hess and Winn, *op. cit.*) not to have been material—at least when measured against the advantage to the issuer of being able to refund its bonds at any time." SEC, *28th Annual Report*, p. 93.

[30] This study included the period from May 14, 1957, through fiscal year 1965, and was based on simple and weighted (by volume) averages of bids by underwriters and of amounts sold at the syndicate offering price up to the date of termination of the syndicate, with the time unit over which the averages were taken in each case being a fiscal year. The only statistics that were at variance with the SEC's conclusion were the marketability indices for fiscal years 1963 and 1965. SEC, *31st Annual Report*, pp. 92–93, and earlier *Reports*.

have thought the inclusion of a deferment would increase market attractiveness and reduce the current cost of funds.

On the basis of answers to a questionnaire, Hess and Winn found that in early 1960 large institutional investors thought that on a thirty-year Aa utility issue with a 5¼ per cent coupon, "a five-year (call) deferment would be worth 15 basis points, a ten-year (call) deferment 25 basis points, and a thirty-year deferment (a nonrefundable issue) 30 to 36 basis points," though a wide range of estimates was given in each case.[31] They also found that if both the coupon on new issues and the yield on outstandings were reduced by 1¼ per cent, the median estimated value of a five-year deferment declined to about 5 basis points. This suggests that the value of the call deferments to investors is considered to be an increasing function of the coupon rate on the bond in question.[32]

In addition to borrowers and institutional investors, people acquainted with the financial market have often indicated that a call deferment on a high coupon bond reduces its yield. In 1957, 1959, and 1960, *Moody's Bond Survey* consistently recommended investment in call-protected new issues and in 1959 said: "Because interest rates are close to the highest levels seen in many years, we consider nonrefundable and noncallable provisions in bonds very important for long-term investors. . . . We expect that more of the new issues will have to incorporate protection from early redemption in order to give market attractiveness."[33] In mid-1957 *Moody's* wrote: "As in past weeks, investor preference for protection from early call showed up markedly in the receptions accorded new corporate issues. . . . Issues without protective call provisions required much higher yields."[34] Similarly, the financial section of the *New York Times* in mid-1957 said that callable bonds were selling poorly and public utilities were faced with the need to pay much more than nominally higher yields to get callable loans and that "for bonds of less than top rank . . . maintaining the unlimited call privilege means

[31] Hess and Winn, *op. cit.*, p. 21. Comments in parentheses were added.

[32] One problem in the interpretation of these figures is that Hess and Winn were unable to determine whether the respondents were attempting to give the true or market value of call protection. Although the Hess and Winn study did not include bonds issued in 1960, their estimates are in line with the value put on call protection by the market in early 1960, which was about 15 basis points for a five-year refunding deferment, including the effect of coupon difference due to the initial yield spread.

[33] *Moody's Bond Survey*, August 17, 1959, p. 351.

[34] *Ibid.*, June 24, 1957, p. 463.

incurring ¼ of 1 per cent more in costs," while for an Aaa bond the added cost was ⅛ per cent.[35]

There has, therefore, been some difference of opinion on whether call deferments have an effect on bond yields.

Empirical Evidence

Hess and Winn's study of the influence of deferments on the yield of new corporate issues offered from 1926 to 1959 concluded that the existence of a "call deferment did not influence yields except during the last six months of this 34-year period."[36] This conclusion is misleading because the number of deferred issues before 1957 was too small to permit meaningful comparisons. Between 1926 and 1949 only 17 of the 738 bonds issued had deferments, and these included industrials and private placements as well as publicly offered utilities. The most detailed breakdown that could be made held quality rating and calendar month of issue constant. Because neither utility and industrial issues nor publicly offered and privately placed issues are sufficiently alike to warrant comparison, because private placements are not rated for quality, and because a month is too long a period in which to assume that market conditions remain constant, the data cannot justify the conclusion that "length of call deferment did not influence yields." Similarly, since there were only 12 deferred issues among the 166 new issues in the period from 1950 through 1955 and all 12 of these were on private placements, on which quality ratings are not available, no conclusion on the effect of deferments on yields is possible in this period either. Perhaps the most significant conclusion that can be drawn is that prior to 1956 there was not enough interest in deferments for investors to insist on them, except in some private placements in the early 1950's. No doubt this is explained by the fact that new issue coupons were generally so low that call protection was provided by the coupon and call price and a deferment would have added little.

The basic hypothesis tested in the present study for both new and seasoned issues is that a deferment reduces the yield on a corporate bond if the coupon rate is high enough that investors think there is a possibility of call or of capital gains limitation. This implies a positive relation between the size of the yield spread between callable and deferred issues with a given coupon rate and the size of the yield

[35] *New York Times*, June 23, 1957.

[36] Hess and Winn, *op. cit.*, p. 80.

spread between seasoned callable bonds with this same coupon rate and those with a very low coupon rate, since both yield spreads reflect the market valuation of call protection.

A first corollary hypothesis is that the amount by which the yield is reduced by a deferment is higher for higher coupon bonds, or it increases when the coupon rate increases relative to the expected "normal" and cyclical minimum rates of interest. If expectations about the level of future interest rates have an elasticity of less than one with respect to the present level of interest rates, then when interest rates and the new issue coupon rate increase together, borrowers and investors will believe that the probability of call or of capital gains limitation on new issues has increased. This means that when the new issue coupon rate increases, the amount by which the new issue yield is reduced by a deferment increases even though the level of yields increases simultaneously.[37]

A second corollary, which applies only to seasoned issues, is that the amount by which the yield on a bond with a given coupon rate is reduced by a deferment increases when the level of yields declines.

A third corollary is that the yield spread between callable and deferred issues with the same coupon rate is only a fraction of the yield spread between the same callable bond and a bond with a very low coupon rate. Although deferments limit the exercise of the call option, they provide less call protection than a low coupon. Most deferments restrict refunding only at a lower interest cost (call for other purposes is still permitted) and only for five years. When coupons are high enough that borrowers and investors think there is a high probability that refunding would be profitable within the first five years, they are also apt to think that there will be another chance for refunding after the deferment ends.[38]

[37] This would apply to comparisons for consecutive periods but not necessarily more distant periods, between which there could be major changes in expectations about the "normal" rate of interest.

[38] Thus, for example, most of the bonds issued in 1957 and since refunded were called in late 1962 and 1963, after the deferred issues had become callable. As a result, five out of the ten utility bonds rated A or better issued with deferments in 1957 and having coupons high enough (5 per cent or over) to be threatened by call in 1962–63 actually were called. On the other hand, these deferments did prevent refunding in 1958 when much greater savings could have been realized, the deferments on high coupon bonds issued in 1959–60 prevented their refunding in 1962–63, and if the bonds issued in 1953 had had deferments these deferments would have prevented refunding altogether, because after 1954–55 rates never again fell far enough to make the refunding of these bonds profitable.

Except in 1957, the evidence presented below supports the hypothesis and its corollaries concerning the influence of deferments on bond yields. Based on annual averages, deferments are found to reduce yields by up to 14 basis points.[39] This implies that the capital market is considerably less imperfect than Hess and Winn and various agencies regulating the issuance of corporate bonds have contended.

It was not until 1957 that a significant number of publicly offered corporate bonds had refunding deferments. However, during 1957–66 a substantial proportion of new issues had deferments, and therefore it is possible to compare systematically yields on freely callable and deferred issues.

For new issues, this analysis covers only long-term public utility mortgage bonds and senior debentures rated A, Aa, or Aaa by Moody and publicly offered under competitive bidding in principal amounts of $2 million or more. Quality rating is held constant in all yield comparisons. While size of issue is not held constant, all but a few issues were larger than $10 million. Most of the bonds have a maturity of about 30 years and all are within the 20 to 40 year range. Table 3-4 shows the deferment characteristics of the new issues.

In order to hold market conditions stable, yield comparisons were limited to bonds issued within a period of 10 days of each other. For the period 1957 to mid-1966, it was possible to make 108 such comparisons, each involving one or more freely callable and one or more deferred issues, but not more than one of both. Comparisons were made both between offering yields and between yields at which the bonds were selling in the open market during the first weeks after they

[39] We have not undertaken an independent study of the number of underwriter bids or the success of the winning bidder in marketing an issue for deferred and callable bonds. The SEC found that, in terms of yearly averages, deferred issues have not had an advantage on either count, and may have had a slight disadvantage. However, it should be pointed out that if prices are adjusted to offset any disadvantage of free callability, there would be no reason for a difference in number of bids or success in marketing. Further, superficial study indicates that the average size of deferred issues is larger than the average size of freely callable issues, and that there is an inverse relation between size of issue and number of bids, because the larger the issue the greater the number of underwriters that must combine to make a single bid. Thus, there would be a slight bias against deferred issues in terms of number of bids which was not related to the fact that they were deferred. Third, to the extent that deferred and freely callable issues are not similarly spaced within a given fiscal year, the use of yearly averages could cover up differences. In any event, we found a number of cases where the contemporary financial press said an issue had a better market reception because it had a deferment.

TABLE 3-4. *Classification of New A, Aa, and Aaa Utility Issues With Deferments, 1957–65*

Year	Total Number of Bonds	Total Number of Deferred Issues	Number of Call Deferments[a]	Deferments Other Than Five Years
1957	104	26	5	2 of 10 years 1 of $7\frac{1}{2}$ years
1958	89	23	2	None
1959	75	21	2	1 of 7 years
1960	79	28	4	None
1961	68	27	6	1 of 10 years
1962	69	29	8	None
1963	65	24	10	None
1964	49	23	2	None
1965 Jan.–June	63	28		
1966	50	19		
Total	711	248		

[a]Call deferments restrict use of the call option not only for refunding at lower interest cost but for other purposes as well. Most deferments apply to refunding only.

were released from price maintenance agreements. The latter make it possible to eliminate a major part of any difference in yields due to differences in market conditions at the dates of offering. They also make it possible to discover the market valuation of call deferments when one of the issues was mispriced by the underwriter.

A complication arises because coupon rates on new issues are set so that the offering price will be near par: Any reduction in yield caused by a deferment will tend to lead to a reduction in coupon rate. Consequently, the coupons on the deferred bonds used in the comparisons will be systematically lower than those on the corresponding freely callable issues, and average spreads measured between such pairs will exaggerate the influence of deferments on yields by capturing the effect of differences in coupon rate. To eliminate the influence of differences in coupon rate, prior to averaging, each yield spread was adjusted for the effect of the difference in coupon rates of the deferred and callable issues in the month of issue, using the data in Appendix Table 3-A.

The average yield spreads for each year are presented in Table 3-5. Spreads are negative when the average yield on the deferred issues was lower. Columns (2) and (4) present spreads for offering yields, before and after correction for differences in coupon respectively. Columns

TABLE 3-5. *Average Yield Spreads for New A, Aa, and Aaa Utility Bonds, Callable Issues Compared to Issues With Refunding Deferments, 1957-66*

Year	Number of Comparisons (1)	Offering Yields: Uncorrected for Coupon, Yield Spread (2)	Offering Yields: Uncorrected for Coupon, Signif. Level (3)	Offering Yields: Corrected for Coupon, Yield Spread (4)	Offering Yields: Corrected for Coupon, Signif. Level (5)	Yields After Termination of Price Maintenance: Uncorrected for Coupon, Yield Spread (6)	Yields After Termination of Price Maintenance: Uncorrected for Coupon, Signif. Level (7)	Yields After Termination of Price Maintenance: Corrected for Coupon, Yield Spread (8)	Yields After Termination of Price Maintenance: Corrected for Coupon, Signif. Level (9)	Average Coupon on Deferred Issues (10)	Yield Spread on Seasoned Bonds, Coupon of Deferred New Issue vs. $2\frac{3}{4}$ to $2\frac{7}{8}$ Per cent (11)
1957	20	−5.0	.10	NA	NA	−7.9	.05	NA	NA	4.81	NA
1958	17	−5.4	.025	−1.5	[a]	−7.6	.01	−4.5	.025	4.14	−23.9
1959	11	−22.5	.01	−10.4	.01	−26.5	.01	−13.8	.01	4.97	−28.8
1960	12	−15.0	.01	−9.2	.01	−15.6	.01	−9.9	.01	4.82	−32.9
1961	6	−9.2	.01	−6.8	.01	−7.2	.01	−5.2	.025	4.73	−21.2
1962	8	−1.7	[a]	+0.6	[a]	+1.1	[a]	+3.1	[a]	4.36	−3.8
1963	9	+0.2	[a]	+0.4	[a]	+0.8	[a]	+1.0	[a]	4.40	−5.7
1964	11	+2.0	[a]	+2.6	[a]	−1.5	[a]	−0.8	[a]	4.59	−3.5
1965	8	+0.3	[a]	+0.3	[a]	−4.3	.025	−4.3	.025	4.71	−7.1
1966[b]	6	−11.5	.025	−9.3	.025	−15.3	.01	−13.2	.01	5.27	−16.8

SOURCE: *Moody's Bond Survey* and Appendix Table 3-A.

NA = required data not available.

[a] = not significant at the .10 level.

[b] January to June.

(6) and (8) present the corresponding spreads for market yields after termination of price maintenance agreements. In the column to the right of each average yield spread is the significance level applicable to tests of the null hypothesis that the average yield spread is zero. These are based on one-tailed tests for the mean of a normally distributed random variable (the yield spread for individual pairs of bonds) with unknown variance. Column (11) presents the annual average of spreads, calculated in the month of issue for each deferred bond, between the yields of callable seasoned bonds with the same coupon rate as the deferred issue and seasoned bonds with coupon rates of 2¾ to 2⅞ per cent.[40] This measures the market value of the addition of complete refunding protection (offered by a very low coupon) to a freely callable bond with the same coupon as the deferred issue, and can be compared to the market value of the five-year deferment shown in column (8).

The findings in Table 3-5 can be summarized as follows: (a) All annual average yield spreads for 1957 through 1961 and for 1966 are negative. (b) All average spreads for 1958 through 1961 and for 1966, except that for offering yields corrected for coupon in 1958, are statistically significant at the .025 level, and most are significant at the .01 level. (c) The average spreads for 1957 are only marginally significant at the .05 and .10 levels. (d) The average spreads for 1962 through 1965 are random in sign and, except for the negative average yields after termination of price maintenance in 1965, are not statistically significant. (e) Omitting 1957, average yield spreads are largest and statistically significant in the same years that the yield spread in column (11), measuring the market value at current new issue coupon rates of the addition of the complete refunding protection offered by a very low coupon, is relatively high. The yield spread in column (11) is low in each year from 1962 through 1965, indicating that for bonds with the coupon rates on new issues the market value of additional refunding protection was very low. (f) On a year-to-year basis, the direction of change for all statistically significant yield spreads corrected for coupon in columns (4) and (8) is the same as the direction of the change in the average coupon rate in column (10). (g) In every case the average reduction in yield due to deferments is a fraction of the spread in column (11) in the same year. (h) After correction for coupon, at current new issue coupons, average yield reductions due to deferments are 5 to 14 basis points in all years (except 1958) where the additional call protection provided by a low

[40] See Appendix Table 3-A.

coupon reduces yields by over 15 basis points compared to freely callable issues with the same coupon rate as the deferred new issues.

Except for (c), all of these findings provide clear support for the basic hypothesis, that a deferment reduces the yield on a corporate bond *if the coupon rate is high enough that investors think there is a possibility of call or capital gains limitation.* Finding (e)—the low spreads in column (11) for 1962 through 1965—explains finding (d).

A possible explanation for (c), the lack of statistical support for the hypothesis in 1957, is that market valuation of deferments was irregular because both high coupons and deferments were new to the market. This is consistent with the finding of a more uniform valuation of call protection after the market gained experience with high coupons and deferments and after the sudden decline in interest rates in 1958 demonstrated the potentials of the call option and call protection.

Finding (f) supports the first corollary hypothesis, that when the new issue coupon rate increases, the amount by which the new issue yield is reduced by a deferment increases even though the level of yields increases simultaneously.

While the second corollary does not apply to new issues, finding (g) supports the third corollary, that the yield spread between callable and deferred issues with the same coupon rate is only a fraction of the yield spread between the same callable bond and a bond with a very low coupon rate.

To test the same hypotheses concerning the influence of refunding deferments on yields on seasoned bonds, monthly series were constructed at each coupon rate for the average yield of Aa-Aaa utility bonds comparable to those used in the regressions above[41] except that the bonds in the present series have deferments of two years or longer. The yield spreads between these two sets of series for freely callable and deferred issues are presented in Appendix Table 3-B, with spreads negative when the yield on deferred bonds was lower. Table 3-6 presents averages of spreads, broken down by coupon rate, for 1957–61, 1958, 1962–65, and 1966.

No complication due to differences in coupon rates arises here because the spreads are calculated holding coupon rate constant. The spreads for seasoned issues are most similar in nature to those for new issues after termination of price maintenance and after correction for coupon differences, but they differ from the latter in two ways. First, because the seasoned bonds have been outstanding for some time,

[41] See Appendix Table 3-A.

TABLE 3-6. *Average Yield Spreads on Seasoned Aa-Aaa Utility Bonds, Callable Issues Compared to Issues With Deferments of Two Years or More, by Coupon Rate, 1957-66*

Coupon Rate (per cent)	1957–61		Jan.–Aug. 1958		1962–65		Jan.–July 1966	
	Number of Months	Yield Spread	Number of Months	Yield Spread	Number of Months	Yield Spread	Number of Months	Yield Spread
3¾	33	−.01	–	–	–	–	–	–
3⅞	38	−.03	–	–	–	–	–	–
4	23	+.05	–	–	–	–	–	–
4¼	–	–	–	–	41	.00	–	–
4⅜	46	−.05	–	–	48	+.01	7	+.01
4½	35	−.02	–	–	48	.00	7	−.02
4⅝	52	−.05	8	−.08	48	.00	7	−.02
4¾	26	−.03	5	−.06	48	+.01	7	−.03
4⅞	51	−.06	8	−.16	13	+.01	5	−.07
5	51	−.08	8	−.18	23	−.01	4	−.06
5⅛	7	−.09	–	–	–	–	2	−.07
5⅜	4	−.06	–	–	–	–	–	–

SOURCE: Appendix Table 3-B.

deferments in the present series are for less than five years from the date of observation. The period of deferment averaged 3 to 4 years and in a number of cases the average period declined from almost five years to only two years over the set of observations. Second, while the observations for new issues were made only at times when the level of new issue yields was near the coupon rate, for seasoned issues observations were made over a wide range of yield levels.

The findings in Table 3-6 can be summarized as follows: (a) With two exceptions, both low coupon bonds, all average yield spreads in 1957–61, 1958, and 1966 are negative. (b) All spreads for 1962–65 are negligible. (c) Except in 1962–65, spreads were larger on bonds with coupons of 4⅞ to 5⅜ per cent than on those with lower coupon rates. (d) Spreads increased considerably in 1958. (e) Average spreads on high coupon bonds were 6 to 9 basis points during 1957 to 1961 and 1966 and twice that in 1958.

All of these findings provide support for the basic hypothesis about the effect of deferments on yields. Finding (b) is explained in the same way as the parallel finding for new issues. Finding (c) supports the first corollary hypothesis. New issue yields declined considerably in 1958, and finding (d) supports the second corollary, that the amount by which the yield on a bond with a given coupon rate is reduced by a deferment increases when the level of yields declines. The third corollary is supported by a comparison of yield spreads due to differences in coupon rate and those due to deferments.

APPENDIX TABLE 3-A. *Average First-of-Month Yields on Seasoned Long-Term Callable Aa-Aaa Public Utility Bonds, by Coupon Rate, 1957-66*

Date	Coupon Rate																	
	$2\frac{3}{4}$–$2\frac{7}{8}$	$3\frac{1}{8}$–$3\frac{3}{8}$	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
1957																		
Jan.	3.88	3.92	3.93	4.02	4.01	4.00	4.02	4.25	–	–	–	–	–					
Feb.	3.76	3.80	3.79	3.92	3.92	3.95	4.05	4.15	–	–	4.42	–	–					
March	3.69	3.76	3.75	3.93	3.91	3.95	4.00	4.12	–	–	4.36	–	–					
April	3.68	3.74	3.79	3.94	3.95	3.95	4.06	4.15	4.26	–	4.35	–	–					
May	3.78	3.81	3.81	4.00	4.02	–	4.13	4.22	4.32	–	4.39	–	–					
June	3.87	3.88	–	4.07	4.10	–	4.22	4.36	4.37	–	4.44	–	–					
July	4.12	4.17	–	4.24	4.19	–	4.33	4.46	4.52	–	4.56	–	–					
Aug.	4.29	4.27	–	4.36	4.21	4.30	4.33	4.44	4.52	–	4.59	–	–					
Sept.	4.32	4.32	–	4.34	4.22	4.24	4.35	4.48	4.52	4.60	4.59	4.66	–					
Oct.	4.24	4.29	–	4.32	4.23	4.30	4.38	4.51	4.53	4.60	4.62	4.70	4.66					
Nov.	4.21	4.31	–	4.40	4.22	4.28	4.41	4.51	4.55	4.60	4.73	4.76	4.73					
Dec.	4.04	4.10	–	4.18	4.10	4.18	4.29	4.41	4.42	4.52	4.53	4.58	4.64					
1958																		
Jan.	3.60	3.64	–	3.85	3.81	3.89	3.95	4.08	4.11	4.21	4.29	4.47	4.49					
Feb.	3.55	3.59	–	3.82	3.72	3.87	3.93	4.05	4.12	4.27	4.27	4.43	4.52					
March	3.61	3.63	–	3.83	3.72	3.89	3.94	4.03	4.13	4.25	4.28	4.44	4.54					
April	3.66	3.71	3.83	3.92	3.86	3.89	3.97	4.09	4.16	4.27	4.27	4.47	4.57					
May	3.53	3.62	3.77	3.79	3.90	3.86	3.91	4.01	4.11	4.26	4.23	4.47	4.53					
June	3.56	3.63	3.76	3.79	3.85	3.85	3.91	3.99	4.10	4.20	4.20	4.47	4.52					
July	3.62	3.69	3.80	3.84	3.85	3.89	3.92	4.00	4.05	4.20	4.19	4.47	4.56					

(continued)

APPENDIX TABLE 3-A (continued)

Date	Coupon Rate																	
	$2\frac{3}{4}-2\frac{7}{8}$	$3\frac{1}{8}-3\frac{3}{8}$	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
Aug.	3.82	3.82	3.93	3.97	3.95	4.02	3.98	4.09	4.16	4.20	4.27	4.53	4.60					
Sept.	4.14	4.13	4.21	4.19	4.16	4.18	4.22	4.35	4.36	4.32	4.29	4.50	4.57					
Oct.	4.17	4.25	4.27	4.27	4.28	4.27	4.29	4.40	4.41	4.44	4.53	4.62	4.66					
Nov.	4.11	4.22	4.18	4.22	4.20	4.25	4.18	4.30	4.41	4.39	4.41	4.56	4.57					
Dec.	4.09	4.16	4.11	4.19	4.15	4.18	4.14	4.27	4.33	4.35	4.41	4.50	4.60					
1959																		
Jan.	4.18	4.21	4.21	4.27	4.22	4.30	4.23	4.35	4.40	4.38	4.45	4.56	4.57	–				
Feb.	4.25	4.26	4.24	4.27	4.24	4.34	4.30	4.37	4.42	4.47	4.48	4.56	4.59	–				
March	4.17	4.21	4.17	4.23	4.23	4.26	4.21	4.28	4.34	4.38	4.39	4.53	4.54	–				
April	4.27	4.32	4.23	4.29	4.25	4.31	4.21	4.34	4.38	4.40	4.47	4.56	4.59	–				
May	4.46	4.47	4.38	4.45	4.39	4.45	4.50	4.50	4.47	4.56	4.55	4.68	4.62	–				
June	4.60	4.60	4.53	4.57	4.59	4.59	4.58	4.60	4.61	4.66	4.64	4.75	4.74	–				
July	4.58	4.60	4.53	4.57	4.57	4.59	4.62	4.59	4.61	4.64	4.66	4.75	4.72	–				
Aug.	4.55	4.58	4.53	4.53	4.53	4.56	4.55	4.57	4.58	4.60	4.63	4.70	4.72	–				
Sept.	4.59	4.67	4.55	4.65	4.63	4.62	4.62	4.60	4.68	4.72	4.76	4.81	4.87	4.93				
Oct.	4.73	4.72	4.66	4.76	4.70	4.68	4.71	4.79	4.79	4.83	4.81	4.88	4.93	4.99				
Nov.	4.59	4.65	4.61	4.63	4.61	4.63	4.66	4.73	4.76	4.79	4.78	4.87	4.97	4.99				
Dec.	4.52	4.55	4.54	4.55	4.58	4.65	4.65	4.71	4.73	4.80	4.78	4.87	4.93	4.98				
1960																		
Jan.	4.66	4.66	4.65	4.72	4.69	4.72	4.73	4.79	4.83	4.87	4.83	4.92	4.95	5.07	5.03	–	–	5.37
Feb.	4.63	4.59	4.61	4.64	4.64	4.72	4.74	4.76	4.77	4.84	4.85	4.92	4.92	5.01	4.99	5.02	5.17	5.32

(continued)

APPENDIX TABLE 3-A (continued)

Date	Coupon Rate																	
	$2\frac{3}{4}$–$2\frac{7}{8}$	$3\frac{1}{8}$–$3\frac{3}{8}$	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
March	4.52	4.55	4.53	4.55	4.54	4.58	4.63	4.76	4.72	4.76	4.79	4.88	4.88	4.95	4.98	5.06	5.14	5.30
April	4.41	4.40	4.38	4.43	4.48	4.53	4.54	4.57	4.59	4.65	4.68	4.81	4.84	4.89	4.89	4.94	5.04	5.24
May	4.46	4.52	4.44	4.47	4.49	4.53	4.52	4.58	4.56	4.68	4.73	4.81	4.87	4.91	4.90	4.98	5.07	5.24
June	4.52	4.57	4.47	4.51	4.53	4.60	4.59	4.65	4.62	4.72	4.75	4.82	4.86	4.93	4.94	4.99	5.07	5.24
July	4.45	4.43	4.43	4.46	4.47	–	4.54	4.61	4.59	4.63	4.69	4.73	4.78	4.86	4.89	4.93	5.03	5.24
Aug.	4.21	4.29	4.20	4.31	4.27	–	4.34	4.38	4.44	4.49	4.54	4.64	4.69	4.75	4.82	4.86	4.97	5.24
Sept.	4.17	4.19	4.14	4.21	4.14	–	4.29	4.35	4.44	4.46	4.50	4.62	4.69	4.76	4.81	4.86	4.95	5.24
Oct.	4.25	4.29	4.27	4.35	4.20	–	4.32	4.45	4.47	4.57	4.61	4.66	4.71	4.78	4.80	4.87	4.98	5.24
Nov.	4.26	4.29	4.29	4.33	4.38	–	4.39	4.51	4.56	4.59	4.64	4.67	4.72	4.81	4.83	4.86	4.98	5.24
Dec.	4.37	4.38	4.39	4.41	4.41	–	4.54	4.59	4.63	4.71	4.75	4.77	4.79	4.84	4.88	4.97	5.01	–
1961																		
Jan.	4.31	4.36	4.36	4.38	4.38	–	4.48	4.45	4.58	4.61	4.64	4.70	4.74	4.80	4.86	4.89	5.00	
Feb.	4.26	4.29	4.30	4.30	4.30	–	4.35	4.37	4.40	4.48	4.52	4.60	4.66	4.74	4.83	4.81	4.97	
March	4.12	4.18	4.16	4.17	4.14	–	4.19	4.27	4.32	4.37	4.42	4.53	4.61	4.69	4.80	4.81	4.96	
April	4.20	4.25	4.24	4.24	4.22	–	4.27	4.35	4.25	4.41	4.47	4.55	4.63	4.71	4.79	4.83		
May	4.33	4.35	4.36	4.40	4.39	–	4.37	4.42	4.50	4.56	4.59	4.64	4.67	4.73	4.82	4.85		
June	4.33	4.32	4.34	4.39	4.36	–	4.39	4.45	4.44	4.61	4.63	4.66	4.70	4.74	4.82	4.84		
July	4.42	4.41	4.44	4.45	4.46	–	4.50	4.50	4.54	4.64	4.69	4.72	4.77	4.81	4.85			
Aug.	4.45	4.44	4.45	4.45	4.46	–	4.51	4.51	4.56	4.62	4.65	4.69	4.73	4.79	4.86			
Sept.	4.49	4.55	4.49	4.50	4.53	–	4.52	4.53	4.53	4.62	4.61	4.68	4.73	4.79	4.85			
Oct.	4.43	4.43	4.43	4.43	4.42	–	4.48	4.45	4.47	4.51	4.55	4.59	4.67	4.73	4.82			
Nov.	4.37	4.38	4.38	4.43	4.39	–	4.39	4.39	4.44	4.46	4.50	4.59	4.67	4.73	4.82			
Dec.	4.40	4.40	4.38	4.39	4.38	–	4.39	4.41	4.44	4.47	4.51	4.59	4.67	4.73	4.82			

(continued)

APPENDIX TABLE 3-A (continued)

Date	Coupon Rate																	
	$2\frac{3}{4}-2\frac{7}{8}$	$3\frac{1}{8}-3\frac{3}{8}$	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
1962																		
Jan.	4.44	4.45	4.43	4.45	4.41	–	4.42	4.42	4.47	4.51	4.52	4.62	4.68	4.73	4.82			
Feb.	4.42	4.42	4.40	4.41	4.37	–	4.39	4.42	4.46	4.50	4.50	4.59	4.67	4.73	4.81			
March	4.40	4.41	4.39	4.42	4.37	–	4.39	4.41	4.45	4.49	4.48	4.59	4.67	4.73	4.81			
April	4.31	4.30	4.30	4.31	4.32	–	4.33	4.35	4.40	4.42	4.44	4.53	4.62	4.70	4.81			
May	4.20	4.20	4.22	4.24	4.23	–	4.22	4.25	4.29	4.35	4.41	4.49	4.61	4.70	4.80			
June	4.23	4.24	4.22	4.27	4.14	–	4.21	4.27	4.30	4.37	4.41	4.50	4.64	4.72	4.78			
July	4.28	4.30	4.29	4.32	4.19	–	4.23	4.31	4.34	4.42	4.42	4.53	4.66	4.73	4.79			
Aug.	4.37	4.35	4.35	4.39	4.33	–	4.34	4.33	4.36	4.44	4.46	4.52	4.65	4.73	4.79			
Sept.	4.25	4.26	4.26	4.29	4.26	–	4.27	4.25	4.30	4.37	4.43	4.51	4.61	4.71	–			
Oct.	4.19	4.20	4.21	4.26	4.23	–	4.24	4.24	4.28	4.35	4.41	4.51	4.62	4.71	–			
Nov.	4.13	4.16	4.16	4.19	4.16	–	4.20	4.24	4.26	4.35	4.40	4.50	4.60	4.70	–			
Dec.	4.13	4.14	4.12	4.20	4.16	–	4.18	4.21	4.25	4.32	4.38	4.49	4.60	4.69	–			
1963																		
Jan.	4.15	4.15	4.14	4.17	4.16	–	4.16	4.22	4.23	4.32	4.38	4.48	4.60	4.69				
Feb.	4.14	4.13	4.14	4.15	4.10	–	4.16	4.21	4.21	4.30	4.38	4.49	4.60	4.71				
March	4.14	4.14	4.17	4.15	4.07	4.19	4.17	4.23	4.26	4.31	4.37	4.49	4.59	4.71				
April	4.15	4.16	4.16	4.16	4.13	4.23	4.21	4.24	4.26	4.31	4.35	4.49	4.60	4.71				
May	4.25	4.24	4.24	4.22	4.15	4.26	4.26	4.31	4.32	4.37	4.39	4.49	4.59	4.72				
June	4.25	4.25	4.23	4.25	4.15	4.26	4.24	4.28	4.31	4.35	4.38	4.49	4.59	4.72				
July	4.25	4.25	4.24	4.23	4.20	4.23	4.24	4.27	4.29	4.34	4.37	4.49	4.58	4.72				
Aug.	4.25	4.26	4.26	4.26	4.26	4.26	4.26	4.31	4.31	4.37	4.40	4.50	4.58	4.73				

(continued)

APPENDIX TABLE 3-A (continued)

Date	Coupon Rate																	
	$2\frac{3}{4}-2\frac{7}{8}$	$3\frac{1}{8}-3\frac{3}{8}$	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
Sept.	4.25	4.25	4.25	4.26	4.26	4.24	4.24	4.31	4.32	4.36	4.39	4.50	4.58	4.73				
Oct.	4.30	4.31	4.30	4.32	4.31	4.33	4.30	4.33	4.36	4.38	4.41	4.50	4.58	4.73				
Nov.	4.30	4.30	4.30	4.30	4.31	4.33	4.31	4.33	4.35	4.39	4.42	4.50	4.58	4.71				
Dec.	4.31	4.32	4.31	4.31	4.29	4.39	4.32	4.34	4.37	4.42	4.44	4.51	4.58	4.70				
1964																		
Jan.	4.39	4.38	4.39	4.39	4.41	4.44	4.40	4.40	4.44	4.46	4.47	4.53	4.61	4.70				
Feb.	4.33	4.35	4.35	4.36	4.41	4.37	4.37	4.37	4.41	4.42	4.45	4.53	4.60	4.70				
March	4.33	4.32	4.33	4.34	4.35	4.39	4.36	4.35	4.37	4.39	4.43	4.52	4.61	4.70				
April	4.41	4.42	4.41	4.40	4.40	4.39	4.42	4.41	4.41	4.45	4.49	4.54	4.61	4.69				
May	4.43	4.42	4.43	4.41	4.40	4.48	4.44	4.41	4.41	4.45	4.49	4.54	4.61	4.73				
June	4.41	4.41	4.41	4.40	4.40	4.44	4.43	4.41	4.43	4.45	4.48	4.54	4.61	4.71				
July	4.40	4.41	4.39	4.38	4.41	4.41	4.41	4.41	4.44	4.45	4.48	4.53	4.61	4.71				
Aug.	4.38	4.38	4.38	4.37	4.38	4.41	4.40	4.39	4.43	4.43	4.47	4.53	4.62	4.71				
Sept.	4.38	4.38	4.38	4.37	4.38	4.41	4.40	4.39	4.41	4.43	4.47	4.53	4.62	4.73				
Oct.	4.40	4.39	4.40	4.39	4.40	4.41	4.41	4.40	4.43	4.44	4.48	4.53	4.64	4.73				
Nov.	4.40	4.39	4.39	4.38	4.40	4.43	4.41	4.40	4.43	4.44	4.47	4.53	4.62	4.71				
Dec.	4.41	4.43	4.40	4.40	4.41	4.40	4.41	4.41	4.45	4.45	4.48	4.54	4.63	4.73				
1965																		
Jan.	4.39	4.39	4.39	4.39	4.42	4.40	4.40	4.39	4.42	4.43	4.48	4.54	4.63	4.73				
Feb.	4.37	4.35	4.36	4.37	4.40	4.38	4.37	4.38	4.40	4.40	4.46	4.54	4.62	4.73				
March	4.38	4.37	4.38	4.38	4.41	4.41	4.39	4.39	4.41	4.44	4.47	4.54	4.64	4.73				

(continued)

APPENDIX TABLE 3-A (concluded)

Date	Coupon Rate																	
	$2\frac{3}{4}-2\frac{7}{8}$	$3\frac{1}{8}-3\frac{3}{8}$	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
April	4.39	4.38	4.39	4.39	4.41	4.41	4.40	4.40	4.42	4.44	4.48	4.54	4.64	4.74				
May	4.40	4.39	4.40	4.40	4.41	4.41	4.41	4.41	4.43	4.44	4.48	4.54	4.64	4.75				
June	4.42	4.43	4.45	4.44	4.47	4.46	4.45	4.44	4.48	4.48	4.51	4.56	4.65	4.76				
July	4.43	4.44	4.43	4.44	4.47	4.47	4.47	4.46	4.49	4.49	4.53	4.47	4.66	4.76				
Aug.	4.45	4.47	4.44	4.45	4.48	–	4.47	4.45	4.50	4.50	4.52	4.58	4.67	–				
Sept.	4.49	4.50	4.50	4.52	4.52	–	4.52	4.54	4.55	4.56	4.59	4.65	4.68	–				
Oct.	4.53	4.55	4.52	4.54	4.54	–	4.54	4.55	4.57	4.60	4.60	4.67	4.70	–				
Nov.	4.55	4.55	4.52	4.55	4.57	–	4.57	4.57	4.57	4.61	4.63	4.69	4.71	–				
Dec.	4.65	4.68	4.66	4.67	4.67	–	4.67	4.66	4.64	4.69	4.71	4.73	4.74	–				
1966																		
Jan.	4.75	4.84	4.74	4.75	4.77	–	4.76	4.78	4.77	4.79	4.76	4.81	4.86	–				
Feb.	4.77	4.81	4.79	4.80	4.84	4.82	4.80	4.82	4.82	4.82	4.77	4.88	4.92	4.94				
March	4.95	4.95	4.96	4.99	4.95	5.03	4.98	4.97	4.95	5.01	4.99	5.03	5.05	5.11				
April	5.01	5.06	5.00	5.04	5.09	5.05	5.04	5.03	5.02	5.05	5.03	5.07	5.07	5.09				
May	5.03	5.05	5.02	5.01	4.99	5.10	5.05	5.03	5.01	5.04	5.04	5.06	5.06	5.16				
June	5.05	5.06	5.02	5.03	5.06	5.10	5.08	5.04	5.07	5.08	5.10	5.15	5.17	5.20				
July	5.07	5.09	5.03	5.07	5.06	5.10	5.11	5.11	5.10	5.11	5.11	5.22	5.20	5.27				
Aug.	5.20	5.24	5.19	5.22	5.15	5.25	5.22	5.24	5.20	5.24	5.26	5.31	5.29	5.38	5.37			
Sept.	5.51	5.52	5.48	5.47	5.15	5.55	5.58	5.59	5.54	5.52	5.52	5.66	5.55	5.58	5.64			
Oct.	5.51	5.49	5.50	5.49	5.49	5.48	5.52	5.50	5.52	5.50	5.54	5.63	5.55	5.52	5.55			
Nov.	5.34	5.32	5.34	5.32	5.36	5.35	5.37	5.36	5.33	5.35	5.35	5.40	5.37	5.35				
Dec.	5.35	5.38	5.35	5.30	5.29	5.38	5.38	5.35	5.33	5.39	5.37	5.42	5.44	5.40				

NOTES TO APPENDIX TABLE 3-A

NOTE: Quotations were taken from the daily public utility quotation sheets of Solomon Brothers and Hutzler and The First Boston Corporation, and are calculated from the asked price for individual bonds on the business day closest to the beginning of the month. Yields are therefore a few basis points lower than if they had been calculated in the more conventional manner from the mid-point of the bid and asked prices. The series for 3 1/8 to 3 3/8 bonds was constructed by Sidney Homer. The averages include all Aa-Aaa utility bonds maturing between 1980 and 2010, except convertibles and sinking fund debentures, issues smaller than $10 million, and issues outstanding less than four months. Gaps in the series arise when there were no observations for bonds with the specified coupon rate.

APPENDIX TABLE 3-B. *Spreads Between Average First-of-Month Yields on Seasoned Long-Term Callable Aa-Aaa Public Utility Bonds and Similar Bonds With Refunding Deferments of Two Years or More, by Coupon Rate, 1957–66*

	Coupon Rate															
Date	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
1957																
Jan.																
Feb.																
March																
April																
May																
June						−.03										
July						−.12										
Aug.						−.06										
Sept.						−.07		−.04								
Oct.						−.07		−.01	+.06	+.05	+.01					
Nov.						−.07		+.04	−.02	+.02	−.02					
Dec.						−.03		−.05	−.08	−.05	−.06					
1958																
Jan.						−.10		−.04	−.10	−.13	−.10					
Feb.						−.11		−.08	−.08	−.13	−.16					
March								−.08	−.06	−.12	−.19					
April		−.14						−.12	−.05	−.14	−.21					
May		−.05						−.14	−.01	−.19	−.20					
June		−.06						−.11		−.22	−.20					
July	−.03	−.08	−.01					−.08		−.19	−.25					

(continued)

APPENDIX TABLE 3-B (continued)

Date	Coupon Rate														
	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
Aug.	−.01	−.07	+.05					−.01		−.13	−.15					
Sept.	.00	+.03	+.12					+.06		−.02	−.05					
Oct.	−.03	+.07	+.05					−.06		−.14	−.09					
Nov.	−.04	−.02	+.01					−.13		−.14	−.09					
Dec.	−.03	−.04	+.03			−.05		−.08		−.13	−.15					
1959																
Jan.	+.03	−.04	+.08			−.09		−.07		−.13	−.05					
Feb.	+.02	.00	+.12			−.06	−.01	−.15		−.09	−.04					
March	+.03	−.03	+.06			−.09	−.05	−.10		−.10	−.06					
April	+.01	−.03	+.09			−.07	−.06	−.09		−.08	−.08					
May	−.04	−.05	+.03			−.10	+.08	−.05		−.01	+.02					
June	−.07	−.04	+.01			−.15	−.04	−.08		+.02	.00					
July	−.01	−.03	+.02			−.12	−.07	−.08		−.01	.00					
Aug.	−.03	+.03	+.04			−.09	+.01	−.03		−.04	−.02					
Sept.	+.01	−.07	−.01			−.03	−.03	−.09		.00	−.06					
Oct.	+.02	−.06	+.06			−.07	+.02	−.01		−.03	−.03					
Nov.	.00	−.01	−.02			−.03	−.01	.00		+.01	−.03					
Dec.	−.05	−.01	+.07			−.04	+.02	−.09		−.02	−.08					
1960																
Jan.	−.02	−.07	+.10			−.09	−.11	−.11		−.04	−.07	−.14				
Feb.	−.03	+.01	+.11			−.02	−.01	−.10		−.04	−.03	−.12		−.04		

(continued)

APPENDIX TABLE 3-B (continued)

Date	Coupon Rate															
	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
March	−.04	−.04	+.05			−.10	+.01	−.04		−.03	−.01	−.02		−.13		
April	−.02	−.02	+.05			−.01	+.02	−.03		−.08	−.14	−.11		−.02		
May	+.05	−.01	+.04			.00	+.05	−.05		−.07	−.14	−.10		−.03		
June	+.01	−.02				−.06	.00	−.03		−.04	−.12	−.08				
July	.00	−.01				−.05	−.06	−.01	.00	−.02	−.09	−.08				
Aug.	.00	−.06				+.01	.00	−.06	−.06	−.07	−.11					
Sept.	.00	−.03				.00	−.03	−.09	−.03	−.08	−.11					
Oct.	.00	−.09				−.08	.00	−.06	−.05	−.03	−.08					
Nov.	.00	−.04				−.11	−.06	−.06	−.06	−.02	−.09					
Dec.	+.01	.00				−.04	+.01	−.03	−.04	−.02	−.13					
1961																
Jan.	+.01	+.01				+.06	−.08	−.04	−.04	−.09	−.09					
Feb.	.00	−.02				+.02	−.02	−.06	.00	−.05	−.04					
March	.00	−.01				−.03	−.04	−.05	−.01	−.03	−.08					
April		−.04				−.05	+.06	−.06	−.01	+.02	−.07					
May		−.06				−.01	−.04	−.03	−.14	+.03	−.02					
June						−.05	+.03	−.03	−.05	+.03	−.03					
July						−.03	.00	−.03	−.01	+.03	−.03					
Aug.						−.06	−.06	−.01	−.02	.00	−.03					
Sept.						−.07	−.03	−.02	−.02	−.06	−.01					
Oct.						−.02	−.04	−.01	−.02	−.04	−.02					
Nov.						−.01	−.07	.00	−.01	−.04	−.04					
Dec.						−.01	−.04	−.01	−.02	−.03	−.03					

(continued)

APPENDIX TABLE 3-B (continued)

Date	Coupon Rate														
	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
1962																
Jan.						−.02	−.07	−.05	−.01	−.06	−.03					
Feb.						−.02	−.04	−.02	+.02	−.03	−.03					
March						−.01	−.05	−.03	+.02	−.03	−.04					
April						−.03	−.05	−.02	−.01	.00	−.01					
May						+.03	+.01	.00	−.02	+.04	−.03					
June						+.03	+.02	−.02	.00	.00	−.02					
July						+.02	+.01	−.02	+.02	+.02	−.03					
Aug.					−.01	+.03	+.03	−.05	.00	+.03	−.02					
Sept.					−.03	+.01	.00	−.02	−.02	+.04	−.01					
Oct.					−.01	+.02	−.01	−.01	.00	+.01	−.02					
Nov.					.00	.00	+.01	−.02	+.01	+.02	.00					
Dec.					+.01	+.02	−.02	.00	+.02	+.03	.00					
1963																
Jan.					+.04	+.01	+.02	−.01	+.02	+.04	.00					
Feb.					+.05	.00	+.03	+.01	.00		.00					
March					+.04	.00	+.01	+.02	+.02		+.01					
April					+.01	−.01	+.02	+.02	+.02		.00					
May					.00	−.02	.00	−.02	+.01		+.01					
June					.00	.00	+.01	.00	+.01		+.02					
July					.00	+.01	+.01	.00	+.02		−.02					
Aug.					+.01	.00	+.01	.00	−.01		−.01					

(continued)

APPENDIX TABLE 3-B (continued)

Date	Coupon Rate														
	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
Sept.					+.03	.00	+.01	.00	+.01		−.01					
Oct.					+.02	+.01	−.01	+.01	+.01		.00					
Nov.					+.01	+.01	+.01	.00	+.01		.00					
Dec.					+.01	+.02	+.01	.00	.00							
1964																
Jan.					+.02	+.01	+.01	+.01	.00							
Feb.					+.01	+.02	.00	+.02	+.01							
March					.00	+.01	.00	+.02	.00							
April					.00	−.01	+.02	+.01	.00							
May					−.02	.00	+.02	−.01	.00							
June					−.01	.00	.00	.00	+.01							
July					.00	.00	.00	−.01	+.01							
Aug.					−.01	+.01	−.01	−.02	+.02							
Sept.					−.01	+.01	+.01	−.01	+.02							
Oct.					−.02	+.01	+.01	.00	+.01							
Nov.					−.01	+.01	+.01	.00	+.02							
Dec.					+.01	+.01	−.01	+.01	+.01							
1965																
Jan.					.00	.00	+.01	+.01	+.01							
Feb.					+.02	.00	.00	+.02	−.01							
March					.00	.00	.00	+.01	−.01							

(continued)

APPENDIX TABLE 3-B (concluded)

Date	Coupon Rate														
	$3\frac{3}{4}$	$3\frac{7}{8}$	4	$4\frac{1}{8}$	$4\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	5	$5\frac{1}{8}$	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{1}{2}$	$5\frac{3}{4}$
April					.00	.00	+.01	−.01	.00							
May					−.01	+.01	.00	−.02	.00							
June					−.03	+.01	.00	.00	+.02							
July					−.04	+.01	−.01	.00	.00							
Aug.					−.03	+.01	−.01	−.02	+.01							
Sept.					+.01	+.01	−.01	+.02	−.02							
Oct.					.00	.00	−.01	+.02	+.01							
Nov.					−.02	.00	−.01	+.01	.00							
Dec.					−.01	.00	−.01	−.02	.00							
1966																
Jan.						+.01	−.05	−.03	−.02							
Feb.						+.03	−.03	−.01	−.01							
March						+.01	−.04	−.02	−.02	−.02						
April						.00	.00	−.02	−.04	−.11	−.08					
May						+.03	.00	−.01	−.04	−.09	−.05					
June						+.03	−.01	.00	−.01	−.10	−.07	−.12				
July						−.05	−.03	−.05	−.08	−.01	−.03	−.02				

NOTE: Spreads are measured as the yield on deferred issues minus the yield on callable issues.
SOURCE: See Table 3-1.

APPENDIX TABLE 3-C. *First-of-Month Yield on New Issues, Callable Aa Public Utility Bonds, 1956-66*

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1956	3.25	3.20	3.15	3.45	3.70	3.57	3.73	3.90	4.07	4.01	4.20	4.30
1957	4.50	4.40	4.22	4.29	4.35	4.62	4.85	5.00	4.81	4.78	4.97	4.47
1958	3.94	3.70	4.00	4.00	3.90	3.85	3.95	4.25	4.60	4.57	4.42	4.55
1959	4.60	4.65	4.37	4.47	4.59	5.05	4.95	4.85	5.00	5.25	5.15	5.15
1960	5.25	4.95	5.10	4.85	4.88	4.90	4.80	4.60	4.47	4.65	4.75	5.00
1961	4.60	4.32	4.32	4.52	4.75	4.75	4.85	4.65	4.75	4.55	4.52	4.60
1962	4.65	4.55	4.55	4.40	4.29	4.29	4.39	4.47	4.30	4.30	4.26	4.28
1963	4.28	4.19	4.27	4.27	4.39	4.35	4.32	4.35	4.35	4.38	4.40	4.43
1964	4.50	4.42	4.39	4.50	4.48	4.48	4.44	4.42	4.45	4.47	4.47	4.50
1965	4.45	4.39	4.47	4.48	4.48	4.59	4.56	4.60	4.67	4.70	4.66	4.80
1966	4.90	4.98	5.30	5.15	5.50	5.67	5.67	5.77	6.35	6.05	6.00	6.20

SOURCE: Sidney Homer, "An Analytic Record of Yields and Yield Spreads," Salomon Brothers and Hutzler, New York.