Impact of Call Features on Corporate Bond Yields

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A large proportion of outstanding corporate and government (municipal, agency, and U.S. Treasury) debt gives the issuer the right to call the debt at some future time. Obviously, elementary theory maintains that purchasers of callable debt should require higher bond yields than non-callable purchasers because issuers may exercise the call when interest rates decline. Yet attempts to measure the impact of a call feature on corporate bond yields often find the impact is statistically insignificant, or even the opposite of what elementary option pricing theory would predict.

For instance, Kidwell, Marr, and Thompson [1984] and Fung and Rudd [1986] do not find call features affect yields in a statistically significant way, while Boardman and McEnally [1981] and Crabbe [1991] find that calls impact yields in some time periods but not others. In fact, some of Boardman and McEnally's regressions imply that call provisions actually reduce required yields.

The impact of a call feature on a corporate bond's required yield is complicated by the possibility that the market may view the issuer choice to include a call option as an indicator of future firm behavior and performance. For this reason, agency and signaling theory developed by Myers [1977]; Bodie and Taggart [1978]; Barnea, Haugen, and Senbet [1980]; Robbins and Schatzberg [1986]; and others on why and when issuers choose to include a call provision is very useful. If inclusion of a call conveys positive information to the market regarding the firm's future prospects, as these theories imply, it would tend to reduce the required yield, thus potentially offsetting the yield premium due to the firm being able to call the issue when and if interest rates decline.

We incorporate measures of agency cost and signaling into an empirical analysis of the impact of call features on corporate bond yields. We first describe the potential agency and signaling impacts on bond yields of the decision to include a call. We use a corporate bond database to perform an econometric analysis of the impact of call features on yields. This analysis includes both a test of the impact of call provisions on yields, controlling for other factors, and a probit analysis of factors influencing the decisions to include a call provision.

A noteworthy result is that the market can interpret inclusion of a call feature as a reliable indicator of future firm investment and strong performance, thus reducing the required yield. This finding is different from Crabbe and Helwege [1994], who find call features are not indicative of future investment and performance.

Our approach improves on previous ones in a number of ways. First, we examine *both* the impact of a call feature on yields and the decision to include a call using the same sample of bonds. Many researchers have attempted to estimate the impact of a call on yield, and many

have attempted to estimate the factors that affect the decision to include a call, but none attempt to do both for the same sample of bonds.

Second, we examine whether the decision to attach a call depends partly on management's expectations of the firm's future profitability and investment opportunities. For instance, using ex post profits as a proxy for management expectations, we examine whether expected future earnings growth influences the decision to include a call. To address the agency problem related to underinvestment, we examine whether the call decision is related to expected future capital expenditures.

Crabbe and Helwege also explore this issue, but they use capital expenditures only in the year of issuance. We suggest that investment for firms issuing callable bonds may well occur after bond issuance, and thus examine investment after that time. Perhaps as a consequence, we find evidence that a call provision does ameliorate the underinvestment problem, while Crabbe and Helwege find the opposite. Our work is thus consistent with Mitchell's [1991] suggestion that a longer period than a year or two may be needed.

I. AGENCY AND SIGNALING THEORY

Agency Theory

Numerous reasons have been posited for why firms include a call provision in their debt. First, it has been suggested that financial managers may be good at predicting interest rate movements and will reap gains for stockholders when anticipated rate declines materialize. Others consider it unlikely that issuers are superior forecasters of interest rates. Second, some suggest the total value of the firm may be increased if a call feature is included (because of differences in ordinary and capital gains tax rates). See Yawitz and Anderson [1977] and Marshall and Yawitz [1980] for more on this theory.

More relevant for our research, however, some researchers suggest that call features are included to address the agency costs of issuing debt. Three agency costs of debt are the cost of profitable future investment opportunities forgone (or underinvestment); information asymmetry; and the risk incentive problem, where the last is also called asset substitution.

In the case of opportunity costs, Myers [1977] shows that when risky debt is outstanding, shareholders may not undertake future investments having positive net present value because part (or all) of the benefit may go to bondholders in the form of 1) greater payoffs for states that produce bankruptcy and 2) a reduction in the probability of bankruptcy. Potential bond purchasers recognize that such underinvestment potential reduces the expected value of the firm, and they thus demand greater yield in compensation.

More recently, Parrino and Weisbach [1999] have identified low-risk positive net present value projects that stockholders wish to ignore (and more risky volatile negative net present value projects that stockholders want to accept). Including a call provision enables shareholders to call when investment is later undertaken (at some time after the bond issue), and then immediately reissue debt reflecting improved prospects due to profitable projects. Or, the firm can just purchase the existing debt at the call price, which may well be below the market price. This permits stockholders to regain value that would have been sacrificed to bondholders.

Thus, bond purchasers may interpret a call feature as reducing the likelihood that underinvestment will occur, and thus not demand much if any compensation for potential underinvestment. Recent modeling by Acharya and Carpenter [2000] also indicates that call features address the underinvestment problem.[1]

The second agency cost relates to asymmetric information; for example, a firm is unable to reveal its truly favorable prospects. Bondholders underestimate the value of the firm and will purchase the bonds only at an enhanced (asymmetric information) yield. A solution is to make the bonds callable.

This is beneficial to the issuer because bondholders underestimate the likelihood of a call exercise (and the value of the call feature) because of their pessimistic perceptions of the firm. When the true value is revealed, the bonds can be called and replaced with lower-cost debt. Consequently, bond purchasers may interpret a call as suggesting strong prospects for the firm and require a lower yield.

The third agency cost, risk incentive (asset substitution), concerns the fear that stockholders will expropriate wealth from bondholders by making the firm more risky after bond issuance. Parrino and Weisbach [1999] model cases in which stockholders are willing to accept high-risk projects with negative present value. Bond investors may understand the incentives of shareholders, anticipate such action, and thus demand higher yields to compensate for this risk.

If bonds are callable, however, the value of the call held by stockholders declines if the firm pursues risky negative net present value projects. By making the bonds

callable, the firm is discouraged from undertaking such risky projects. Potential bond purchasers may thus view including a call feature as protection against risky investing, and therefore require a lower yield than on a non-callable bond.

Overall, making a bond callable is a way to deal with agency costs and suggests that behavior adverse to bondholders is less likely.[2]

Calls as Signals

Robbins and Schatzberg [1986], hereafter RS, develop a model indicating that inclusion of a call feature can clearly signal a firm has positive information (good news) and is different from other firms with bad news. In the first period, t = 0, managers contract with owners for their compensation schedules. In the next period, t = 1, the firm invests in a project. At times 1 and 2, investors receive endowments to invest, and the project is liquidated at time 3.

In this scenario, managers receive either bad or good news at t = 1, but the news cannot be shared with the market. Then, at time t = 2, the two probabilities for a lottery on payoffs for the project are available to both the market and the manager. RS demonstrate that the probabilities of the firm receiving either $10 or nothing are different for good- and bad-news firms in this lottery.

The main RS results for our purposes are two lemmas: 1) that the manager of a firm with good news *cannot* signal the good prospects through issuance of non-callable bonds, and 2) that the manager of a firm with good news *can* signal firm prospects through issuance of callable bonds. There is a separating equilibrium.

Wall [1988] disputes the generality of these results using two counterexamples. In the first counterexample, he finds that the results are not robust to different probabilities in the second-stage lottery. If the probabilities are switched for good- and bad-news firms, callable bonds do not represent a separating equilibrium. Bad-news firms can issue callable bonds in hope of being confused with good-news firms. The second counterexample involves changes in the assumed best case payoff of the lottery for good-news firms where short-term debt dominates callable bonds.

Robbins and Schatzberg [1988] in a reply to Wall maintain that the first counterexample is from a broad class of cases where it is not possible to both reduce risk and signal and that the second is based on faulty premises.

If the suggestions of agency theory and RS are correct, a call can clearly inform potential investors that the firm has strong prospects. Such information could serve to reduce required yields and offset higher yields due to optionality. Wall, on the other hand, is doubtful that a call can be a clear signal that the firm has strong prospects, and suggests specific cases where a call cannot be a clear signal.

II. DATA

For the analysis, we collect data on corporate bonds issued between January 1, 1984, and December 31, 1993, from the Lehman Brothers Fixed Income Database. The end date allows us to observe firm performance for an extended period after issuance. We compute firm performance measures for up to five years after issuance, although there are fewer firms, the longer the time since issuance.

In order to insure that callable and non-callable issues are comparable, we impose a number of restrictions. First, we restrict the sample to industrial issuers only, eliminating financial firms and utilities. Second, we eliminate all zero-coupon and deep discount bonds and others with puts or other unusual characteristics such as convertability into equity. Third, we restrict the sample to bonds maturing in 10 to 50 years. Since the database covers only investment-grade bonds in the first part of the period, we limit the sample to bonds rated Baa or above by Moody's and S&P. Finally and importantly, since a non-callable bond with a sinking fund provision is in effect partially callable, we restrict the sample to issues without sinking funds.

A total of 684 new issues meeting these provisions are reported in the database. The Compustat database fails to report any financial information for 17, leaving a basic sample of 667 issues, of which 182 were callable and 485 were non-callable. Descriptive statistics on both callable and non-callable issues and their issuers are reported in Exhibit 1.

The differences between callable and non-callable issues and issuers are statistically insignificant on most dimensions. The median rating for both is A2, and the mean maturity for both is approximately 17.6 years. Likewise, there is little difference in leverage, capital expenditure levels, and asset growth rates (prior to issuance) between firms issuing callable and non-callable debt. The companies issuing non-callables tend to be a little less profitable (lower return on assets) and larger, although the difference in total assets is not significant. Consistent with relative firm size, the non-callable issues tend to be somewhat larger than callables. Callable bonds tend to have higher coupons than non-callables—but this is primarily

EXHIBIT 1
Descriptive Statistics for Callable and Non-Callable Bonds

	Callable Bonds	Non-Callable Bonds	t-value for Difference	Observations
Years to Maturity	17.687	17.604	0.103	667
Issue size (millions)	171.69	203.33	2.932**	667
Coupon	9.16%	8.53%	5.815**	667
Total Assets (millions)	13,243	15,592	0.970	667
Return on Assets (EBIT/total assets)	10.45%	9.16%	2.581*	664
Long-Term Debt/ Total Assets	25.37%	26.12%	0.855	667
Capital Expenditures (millions)	1.039	1.078	0.265	656
Asset Growth Last 2 Years Prior to Issuance	19.31%	18.66%	0.367	650
ROA Change Last 2 Years Prior to Issuance	−1.23%	−2.24%	1.989*	647
Moody's Rating (median)	A2	A2		667
30-Year Government Bond Rate at Time of Issue (G30)	8.43%	7.76%	7.318**	667
Yield Spread over Treasuries	0.911%	1.080%	4.095**	666

Means of various characteristics of callable and non-callable bonds for new issues of corporate bonds from January 1, 1984, through December 31, 1993 (except for bond rating, where the median is reported). T-statistics for a test of the null that the means are not different are reported.

**Indicates significance at the 5% level, and **indicates significance at the 1% level.*

because callable bonds tended to be issued when interest rates were relatively high.

III. YIELD SPREAD DIFFERENCES

Although call provisions give the issuer an option, and this should theoretically increase yield, researchers have found either that the call feature does not significantly affect yields on corporate bonds, or there are impacts in some time periods but not in others, or significant impacts in a few regressions but not in others. Our first task is thus to examine the relative yields to maturity on callable and non-callable issues in our data set.[3]

Yield Spread Determinants

In order to isolate how a call provision impacts yields on a new issue, it is first necessary to control for other factors that impact yields. To control for differences in interest rates at the time of issue, we use as the dependent variable the difference between the promised yield to maturity (YTM) on the corporate bond issue and the YTM on U.S. Treasury bonds of approximately the same maturity on the issue date.

Specifically, we estimate the yield spread on corporate bond i with m years to maturity as $SPREAD_i = YTM_i - G_i$, where YTM_i is the yield to maturity on bond i based on its offer price, and G_i is the yield on government bonds of approximately the same maturity on the issue or offer date. For the Treasury bond rate, G_i, we use the quoted yields provided by the Federal Reserve Bank of New York.

One advantage of the Federal Reserve Treasury yields is that, since they are available for every trading day, we can match the issue date of the corporate bond exactly. Another advantage is that they are quotes for on-the-run issues so they are recent issues like our corporate bonds and are actively traded. A disadvantage is that during this period the U.S. government issued only bonds with 30-year and 10-year maturities. While 69% of our issues have 10- or 30-year maturities, some do not. For the few corporate bond issues that mature in more than 30 years, we use the 30-year government rate for G_i. For bonds

maturing between 10 and 30 years, we use a term structure approximation.[4]

Averages of the yield spreads on callable and non-callable issues are reported in the last row of Exhibit 1. Yield spreads on non-callable issues actually tend to exceed those on callable issues in our data set—the opposite of what one would expect, since it is the issuer, not the bond purchaser, who holds the option. Of course, this yield spread difference may reflect other differences between callable and non-callable issues so we next control for these.

In order to measure the impact of a call option on a bond's YTM or yield spread over Treasuries, we regress yield spreads on new corporate bond issues on a zero-one dummy variable, CALL (1 if the issue includes a call provision and 0 if it is non-callable), and a series of control variables representing the various characteristics of the bond, firm, and market that are expected to impact the bond's YTM.

To measure default risk differences, we define separate dummy variables for each Moody's rating from Aa1 through Baa3 (leaving out Aaa issues). For instance, Aa1 = 1 if the issue is rated Aa1 by Moody's and zero otherwise; Baa1 = 3 if rated Baa3 by Moody's and zero otherwise.[5] Since Aaa issues are the excluded group, a rating dummy's coefficient measures the predicted difference between the YTM for that rating and Aaa issues. Consequently, all should have positive signs, and the coefficients should be higher for the lower ratings.

For about half of the bonds in our sample, Moody's and Standard & Poor's assign equivalent ratings to an issue, and for about half they differ. To capture the independent impact of S&P's ratings, we set the variable SP to be equal to the difference in rating classes between S&P and Moody's. For instance, if S&P assigns an A+ rating while Moody's rates the bond A1, SP = 0. If S&P assigns an A+ rating while Moody's rates the bond Aa3, SP = 1. If Moody's assigns an A3 rating to a bond that S&P rates as A+, then SP = –2. Since YTMs should be higher on issues rated lower by S&P, a positive coefficient is anticipated.

We also include two financial ratios associated with risk of default as control variables. PROFIT is the ratio of the issuing company's earnings before interest and taxes to total assets. LEVERAGE is the ratio of long-term debt (not including the new issue) to total assets. While we would expect a bond's YTM to be inversely correlated in general with the firm's profits and positively correlated with its leverage, these financial ratios should also be reflected in the bond's ratings. Thus, these variables will be significant only if their information is not fully reflected in the ratings. Their coefficients could even take the unexpected sign (negative for leverage and positive for profits) if the market places less weight on a variable than the rating agencies do.

We also include, as a separate independent variable, the log of the issuer's total assets, TA. A negative coefficient is anticipated, since a larger firm's bonds may be more liquid than a smaller firm's, and Ederington, Yawitz, and Roberts [1987], for example, have indicated that for the same rating YTM tends to be lower on bond issues of larger firms.

To control for characteristics of the bond issues themselves that may impact the bond's YTM we include: 1) the log of its term to maturity in years (MATURITY), and 2) the log of the bond issue's size (ISSUESIZE). Although the yield spread is measured on corporate and government bonds of equivalent maturities, the yield curves for corporate and government issues often differ (as described by, for example, Merton [1974] and Longstaff and Schwartz [1995]). If the corporate yield curve is more (less) steeply sloped than the government yield curve, MATURITY will tend to have a positive (negative) coefficient. Larger issues may be more liquid and hence have a lower YTM than a smaller issue, so we include the measure of issue size.

Another set of control variables capture financial market conditions at the time of the new issue. We include two measures of credit spreads: 1) the yield spread between AAA corporate bonds (secondary market yields) and long-term (30-year) government bonds (designated as AAA-GOV), and 2) the spread between BAA and AAA rated issues (BAA-AAA). Both are based on yields reported for the issue date by the Federal Reserve Bank of New York. Since the yield spreads on our bonds should be higher (lower) when yield spreads in general are high (low), positive coefficients are expected for both variables.

We also include a measure of the slope of the yield curve. We define YLDSLOPE as the rate on ten-year government bonds at the time of issuance minus the rate on one-year government securities at the time of issuance.[6]

Researchers such as Estrella and Hardouvelis [1991] and Estrella and Mishkin [1996] have shown that this variable, like the credit spread variables, reflects the market's expectation about future real economic conditions. Specifically, when the economy is expected to worsen (grow), the yield curve tends to be downward- (upward-) sloping. On the presumption that an expected economic decline will lead to a flight to quality, a negative coefficient for this variable is expected.

We also include a measure of interest rate uncertainty. STDDEV is defined as the standard deviation of interest rates, specifically, the rates on one-year government securities over the last twelve weeks. If high (low) interest rate volatility in the recent past indicates high (low) interest rate uncertainty for the future (as GARCH models show), and if high uncertainty causes a flight to quality, i.e., governments, then the yield spread would be expected to rise (fall) when STDDEV is high (low). Consequently a positive coefficient is predicted.

Finally, we include the level of ten-year Treasury interest rates (G10) because, according to Longstaff and Schwartz [1995], spreads are negatively related to the level of interest rates. Duffee [1998] notes that this negative relationship is due to a presumed negative correlation between asset values and interest rate levels. Furthermore, Duffee [1998] maintains that this relation should be stronger for callable bonds, as the value of the call declines with higher levels of interest rates. Thus, to measure the impact of callability we also include the independent variable CALL times the ten-year rate, where call is one for a callable bond and zero for a non-callable bond. According to Duffee, this interaction variable, CALL × G10, is expected to have a negative coefficient.

Missing data for four firms/bond issues reduces the yield spread regression sample to 663 firms.

Results

As reported in Exhibit 2, the results of the yield spread regression indicate that (as expected) spreads depend on the riskiness of the bond issue and the issuer and on market conditions at the time of issuance. With the single exception of the slight inversion of the Aa2 and Aa3 coefficients, the coefficients of the rating dummies increase monotonically, indicating that progressively higher YTMs are associated with progressively lower Moody's ratings. The inversion appears to be due to a couple of Aa3 rated outliers with very low spreads.

As anticipated, the variable representing differences in rating agency opinion (SP) is positive. PROFIT is significant, indicating that this information is not fully impounded in the bond ratings, while the LEVERAGE variable is not quite significant at the 0.05 level. Neither firm size (TA) nor issue size (ISSUESIZE) seems to have much impact on yields.

Although the yield spread is measured against equivalent maturities, the maturity variable (MATURITY) is positive and highly significant, indicating that the corporate bond yield curve is more steeply upward-sloping than the government bond yield curve. All four measures of financial market conditions have the expected sign and are significant at the 1% level, indicating that the spreads between corporate bond rates and governments vary over time depending on economic conditions. Both credit spread variables, AAA-GOV and BAA-AAA, have significant positive coefficients. As implied by the hypothesis that downward-sloping yield curves forecast recessions while strongly upward-sloping curves forecast economic growth, the coefficient of YLDSLOPE is negative and significant. Finally,

EXHIBIT 2
Yield Spread Determinants and Value of a Call

Variable	Coefficient	t-value
Intercept	–0.9749	-2.313*
CALL	–0.0266	–0.154
Aa1	0.0767	0.523
Aa2	0.1545	1.341
Aa3	0.1486	1.280
A1	0.2899	2.644**
A2	0.3910	3.511**
A3	0.5206	4.487**
Baa1	0.6247	5.262**
Baa2	0.9112	7.552**
Baa3	1.1677	9.559**
S&P	0.0566	3.626**
PROFIT (ROA)	–1.2201	–4.756**
LEVERAGE	0.2961	1.947
TA (log of total assets)	0.0207	1.237
MATURITY (log)	0.2297	7.633**
ISSUESIZE (log)	0.0377	1.151
AAA-GOV (yield spread)	0.2792	3.062**
BAA-AAA (yield spread)	0.3486	3.971**
YLDSLOPE (yield curve slope)	–0.0932	–4.319**
STDDEV (std. dev. of interest rates)	0.4615	2.897**
G10 (rate on 10-year Treasuries)	–0.014	–0.644
CALL × G10	–0.018	–0.843
Adjusted R^2 = 0.522		

*Yield spread on individual new corporate bond issues regressed on characteristics of the bond issue, issuing firm, and market conditions at time of issue. Yield spread measured as difference between promised yield to maturity on new issue and market yield on a Treasury bond with the same maturity at time of issue. Sample consists of 663 bond issues between January 1, 1984, and December 31, 1993. *Indicates significance at the 5% level, and ** indicates significance at the 1% level.*

the STDDEV coefficient is positive and significant, implying higher yield spreads when interest rate uncertainty is high.

Of course, our main focus of interest is the coefficient of the CALL variable. As in the results of Boardman and McEnally [1981], this variable has an insignificant coefficient. Although a call provision gives the issuer an option, at the expense of the bondholder, the market apparently does not require a yield premium. Indeed, the coefficient is of the wrong sign, implying lower rates on callable bonds than on non-callables. A possible reason is that the call feature indicates positive information about the issuer, thus offsetting the yield premium due to the option value. Finally, controls for the level of interest rates (G10) and interaction of interest rates with the call feature (CALL × G10) are not significant.

IV. CALL DETERMINANTS

Public Information Variables

Does attaching a call provision to a bond provide a positive signal that may partially offset the option given to the issuer? To answer this question, we focus on the *decision* to include a call provision and the information that a call provision provides. We explore this issue by first relating the call provision decision to various characteristics of the market, issuer, and bond issue that are public information, using a probit relation where the dependent variable, CALL, is equal to one if the bond issue includes a call provision and zero if it does not. We then add variables that proxy for manager inside information at the time of the issue, and determine whether the call decision reflects and signals this inside information.

We have noted that one of the oldest theories of call provisions is that they tend to be included when interest rates are high and expected to decline, so that the firm is likely to face lower financing costs in the future. Since this is also when bond purchasers should demand a higher yield premium on callable issues, this theory seems to rest on the assumption that either bond purchasers do not share these expectations or do not demand full compensation. Nonetheless, Guntay, Prabhala, and Unal [2001] find that call provisions are significantly more prevalent when interest rates are high. We include the variable G10 (the market yield on new ten-year governments at the time of issue) to test whether call provisions are more likely when interest rates in general are high.

Carrying this hypothesis further, we also test whether call provisions are more likely to be included when declines in future rates are expected. If the yield curve reflects expectations regarding likely future interest rates, and call provisions are included when declines in interest rates are viewed as likely, then call provisions should also be more prevalent when the yield curve is flat or downward-sloping than when it is steeply upward-sloping. We include YLD-SLOPE to test this effect. The hypothesis that issuers tend to include call provisions when interest rate declines seem likely implies a negative coefficient.

The argument that issuers include call provisions when interest rates are high and expected to decline also implies that the prevalence of call provisions should be positively correlated with the two credit spread measures, AAA-GOV and BAA-AAA. If spreads between government and corporate bond yields are historically high, then they would normally be expected to diminish in the future. Accordingly, if issuers tend to include call provisions when they expect to face lower financing costs in the future, call provisions should tend to be chosen when these spreads are high. Also, we include the variable STDDEV to test whether call provisions are more or less likely to be included when uncertainty regarding future rates is high or low.

Our main interest is in testing whether call provisions reflect inside information about the firm's future prospects. To insure that our inside information variables do in fact reflect inside information, we include three previously defined control variables to reflect public information about the firm at the time of issuance: 1) a measure of the issuer's size, log of total assets, TA; 2) a measure of its profitability, PROFIT; and 3) a measure of balance sheet leverage, LEVERAGE. While we have no a priori expectation regarding the signs of these variables, Guntay, Prabhala, and Unal [2001] report that small firms are more likely to include call provisions than large firms.

Finally, we include as control variables several characteristics of the bond issue itself. RATING designates Moody's rating of the issue, where RATING = 2 if the issue is rated AAA by Moody's, 3 if rated AA1, 4 if rated AA2, …, and 11 if rated BAA3.

In the yield spread regression, we define separate dummy variables for each rating because we know that the impact of ratings on yields is both important and nonlinear. Yet, given the results in Exhibit 1, it appears unlikely that rating effects are strong enough to show up in separate dummy variables so the simple linear measure is used.

Since the evidence in Exhibit 1 indicates that there may be a greater tendency to include call provisions on smaller issues than larger issues, perhaps because of higher agency costs, we include the log of the size of the bond

EXHIBIT 3
Call Provision Decision

	Probit 1: Only Variables Public at Time 0		Probit 2: Forward-Looking Variables	
	Coefficient	z-Statistic	Coefficient	z-Statistic
Intercept	–2.4335	–1.433	–2.5663	–1.486
G10 (10-year Treasury rate)	0.2727	3.741**	0.2918	3.898**
YLDSLOPE (slope of yield curve)	0.2741	3.127**	0.2515	2.791**
AAA-GOV	1.1831	3.299**	1.1153	3.049**
BAA-AAA	0.7582	2.158*	0.6859	1.926
STDDEV (std. dev. of interest rates)	–0.3443	–0.534	–0.2514	–0.384
TA (log of total assets)	0.0999	1.411	0.1404	1.940
PROFIT (ROA)	0.1993	0.222	–0.8812	–0.880
LEVERAGE	0.1179	0.185	0.2709	0.410
RATING (Moody's)	–0.0213	–0.577	–0.0082	–0.216
ISSUESIZE (log)	–0.3358	–2.449*	–0.3772	–2.702**
MATURITY (log)	0.3373	2.660**	0.2998	2.325*
FUTURE_PROFIT			2.3889	2.076*
ASSET_GROWTH			0.4926	2.782**
Likelihood Ratio Statistic	88.40		104.4	

*Probit relations estimated for likelihood that new issue includes a call provision. A positive coefficient indicates that a higher value for that variable increases the likelihood that a call provision is included. The bonds used are the same as those in Exhibit 2. *Indicates significance at the 5% level, and ** indicates significance at the 1% level.*

issue, ISSUESIZE. Finally, we include the log of the issue's term to maturity, MATURITY. We would expect call provisions to be more important to issuers of longer-term issues. Of course, bond purchasers may demand a higher premium on these issues, so the net impact is uncertain.

Public Information Variables Only

Results for public information variables only are shown in the columns labeled "probit 1" in Exhibit 3. Evidence on the hypothesis that call provisions tend to be included when interest rates on new corporate bond issues are high and expected to decline is mixed.

Consistent with the hypothesis, the coefficients of G10, AAA-GOV, and BAA-AAA are all positive and significant at the 0.05 level or better. According to these results, call provisions are more likely to be included when interest rates in general are high and when interest rate spreads between corporates and governments and between low- and high-rated corporate bonds are high. On the other hand, the significant and positive coefficient for YLDSLOPE indicates that calls are also more likely when the yield curve is strongly upward-sloping, indicating (according to the expectations hypothesis) that future interest rate declines are not expected.

We can sum this up by saying it appears that calls are included when rates are high, so that issuers would logically like to be able to call and refinance in the future but when they do not expect actually to be able to do so.

Unlike the market variables, none of the issuer characteristics is significant. There is no evidence that the propensity to include a call provision varies with public information regarding the issuer's size, profitability, or leverage. The size finding is at odds with Guntay, Prabhala, and Unal [2001], who find that small firms are more likely to attach call provisions.

Likewise, there is no evidence that the likelihood of a call provision varies with an issue's default risk. It does appear that issuers are more likely to include a call provision on relatively small bond issues with long terms to maturity.

The maturity result is in line with our expectations since there should be more reason to wish to call a 30-year bond than a 10-year, but is particularly interesting since we observed no difference on a univariate basis in Exhibit 1. When we control for market conditions at the time of issuance and other issue characteristics, this impact becomes clearer.

Private Information and the Call Decision

The insignificance of the call dummy in the yield spread regression in Exhibit 2 leads us to ask whether the presence of a call provision provides the market with positive information. As argued above, inclusion of a call may signal to prospective bond purchasers resolution of agency costs and positive prospects. An issuer might wish to include a call if it foresees its credit quality improving in the future so that the issue could be refinanced at lower rates; it might not wish to include a call if it foresees the firm's creditworthiness falling.

While we cannot measure management's expectations directly, we would expect actual results to be distributed randomly around those expectations so that we can proxy management's expectations with actual ex post results. Therefore, we add measures of the firm's profitability and growth following the bond issue to the probit equations.[7]

Already included in the probit estimation is a measure of firm profitability prior to the bond issuance, defined as the ratio of earnings before interest and taxes (EBIT) to total assets in the year prior to the bond issuance. To proxy for management's earnings expectations we add the variable, FUTURE_PROFIT, defined as the ratio of EBIT to total assets in year t + 2 where t is the year of the bond issuance. The hypothesis that managers are more likely to include a call provision when they foresee particularly positive financial prospects implies a positive coefficient.

The second information proxy, ASSET_GROWTH, is measured as the percentage growth in the firm's total assets from the year before the bond issue through two years after. As Crabbe and Helwege [1994] suggest, asset growth reflects investment activity; that is, firms using calls may be less likely to pass up profitable projects and are likely to invest later when positive information becomes known to the market. The hypothesis that inclusion of a call provision signals to the market resolution of the underinvestment problem implies a positive coefficient.

Results are reported in the second set of columns (labeled "probit 2") in Exhibit 3. The hypothesis that a call reveals positive information about the firm's future prospects is confirmed, in that both inside information variables have positive and significant coefficients. While the likelihood of a call appears unrelated to public information about the firm such as leverage and profitability at the time of issuance, the likelihood of a call appears strongly related to asset growth and future profitability. ASSET_GROWTH has a positive coefficient and is significant at the 1% level, indicating that a call provision is more likely if management foresees significant future growth opportunities. The coefficient of FUTURE_PROFIT is also positive, and is significant at the 5% level.

It is revealing to compare the coefficients of FUTURE_PROFIT and PROFIT. While the coefficient of the public information variable, PROFIT, is negative and insignificant, that of FUTURE_PROFIT is positive and significant.

In other words, a call provision appears considerably more likely among firms that subsequently grow rapidly. There is also evidence that calls are more likely among firms whose profitability improves. This could explain why investors do not demand a higher premium on callable issues in that they interpret the call as suggesting that management foresees strong profitability and growth opportunities.

As further evidence on this issue, Exhibit 4 provides univariate information about comparative growth in firm profitability. Here we compare profitability growth for callable versus non-callable issuers for one, two, and three years after issuance. Profitability growth is defined as

EXHIBIT 4

Post-Issuance Profitabiity Growth for Callable versus Non-Callable Issuers

	$\frac{EBIT_1 - EBIT_{-1}}{TA_0}$		$\frac{EBIT_2 - EBIT_{-1}}{TA_0}$		$\frac{EBIT_3 - EBIT_{-1}}{TA_0}$	
	Number	Mean	Number	Mean	Number	Mean
Callable	180	1.78%	179	2.86%	142	3.54%
Non-Callable	483	0.05%	480	1.03%	368	1.83%
t-statistic	3.43		2.822		1.937	
(p value)	0.000		0.004		0.053	

$(EBIT_i - EBIT_{-1})/TA_0$ where i is 1, 2, and 3 years after issuance, and $EBIT_{-1}$ is EBIT in the year before issuance. TA_0 is total assets in year of issuance.

For all three years, callable bond issuers have significantly greater profit growth, indicating again that the presence of a call provision may signal that management foresees strong profitability growth. Results for four and five years after issuance were also calculated. We do not report them here as the sample size was considerably diminished due to such things as mergers (and the t– statistics were not significant).

V. CONCLUSION

The call feature has attracted the attention of financial researchers for many years. Most early analysis focuses on the firm's ability to call the debt if and when interest rates declined where, to the disadvantage of the bondholder, the firm may replace the bonds with lower-yielding debt. Of course, basic theory maintains that the firm should pay for this option with higher yields at issuance.

More recently, agency and signaling theory have provided for analysis of the call option from a different perspective; calls may allow the firm to avoid agency costs of debt such as those associated with underinvestment, asymmetric information, and asset substitution. Furthermore, a call can be interpreted as a signal or at least a suggestion that the firm has strong prospects for profitability and growth.

Given that this latter type of effect would tend to reduce yields, the net impact of a call on yields at issuance is interesting and complex. We find solid evidence that a call can be interpreted as an indication that a firm has strong profitability and growth prospects. On average, this makes the net effect of including a call potentially negligible.

ENDNOTES

The authors appreciate research support provided by the Bank of Oklahoma.

[1]Even though the call can suggest firm behavior more favorable to bondholders, inclusion of a call cannot necessarily be construed as an unambiguous signal that behavior unfavorable to bondholders will not occur. The call can be construed as an ex post way of regaining a portion of the agency costs in the future. Mitchell [1991] calls this damage containment, and maintains that, for example, firms financing both high- and low-quality projects may choose bonds with similar features in a pooling (not separating) equilibrium. Recontracting (calling) can be accomplished readily after information becomes symmetric.

[2]Allen, Lamy, and Thompson [1987] and Kerins [2001] investigate calls that supposedly prevent call for refunding for a period of time. They find that such a provision is quite weak. The empirical tests of our research are applicable for this type of call, as the firm still holds an option to call debt where, for example, the call value will decline if underinvestment and asset substitution occur.

[3]King and Mauer [2000] find that some bond call options are not immediately exercised when they become callable, suggesting that perhaps call value is weaker than standard option calculations would suggest.

[4]Let the two government issues be represented by G_{10} and G_{30}, respectively. We approximate the YTM on a government bond issue that matures in m years, where $10 \leq m \leq 30$, as $G_m = [(m - 10)/20]G_{30} + [(30 - m)/20]G_{10}$. For instance, the equivalent YTM on a 15-year government issue is calculated as $0.25G_{30} + 0.75G_{10}$. This is the same approximation used by Collin-Dufresne, Goldstein, and Martin [2001]. While we could match the maturities more exactly using another data source, the quotes would be for seasoned or off-the-run issues, and would not be available daily.

[5]Some studies include a single linear value for the rating, e.g., RATING = 1 if rated Aaa, 2 if rated Aa1, 3 if rated Aa2. This procedure forces the yield difference between adjacent ratings to be the same, although it is well known that rating differences tend to widen with lower ratings. That is, the difference in YTMs between a Ba2 and a Ba3 rated issue is normally greater than between Aa2 and Aa3 bonds.

[6]While the slope of the yield curve varies, it is never in fact downward-sloping in our data set.

[7]Crabbe and Helwege [1994] and Sarkar [2001] have modeled the decision to include a call. Again, our procedure differs in that we include information about post-issuance firm performance for an extended period. For example, Crabbe and Helwege use capital expenditures in the *year of issuance*, maturity, and credit quality to predict callability.

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