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Abstract

This paper seeks to explain determinates of the choice and the pricing of various types of callable and non-callable bonds. We find that the popularity of different types of callable and non-callable bonds is significantly related to the economic environment. In addition, the popularity of claw back bonds appear to be driven by agency considerations, make whole bonds by the debt overhang problem, ordinary callable bonds by the need by banks to deal with interest rate changes and non-callable bonds by the need to raise funds as cheaply as possible. All else equal, firms pay a higher offer spread for the flexibility to call a claw back bond early via a new share offering whereas issuers of make whole bonds are rewarded with a lower offer spread for restricting calls to circumstances that does not expropriate bondholder wealth.

Keywords: Callable bonds, Non-callable bonds, Claw back call provisions, whole make call provisions
JEL classification: G24, G32, G38, K12, K22

In recent years many bond indenture agreements include two new provisions, the make whole and the claw back provision that refine the circumstances upon which a bond can be called prior to maturity. In this paper, we examine determinates and the pricing of make whole and claw back bonds as well as ordinary callable and non-callable bonds.

The make whole call price represents the present value of all coupon and principal repayments. Specifically, the call price is determined by a discount rate set as the yield on a similar maturity Treasury bond plus a fixed spread. This implies that the firm has little incentive to refinance its debt due to a fall in the level of interest rates or a narrowing of the credit spread. Similarly, the claw back provision reduces the incentive to refinance in order to save on interest costs by allowing the firm to call debt only from the proceeds of an equity issue. However, claw back bond issuers are still able to gain financial advantage if the credit spread is inversely correlated with stock prices.

To illustrate, examine the information presented for two claw back bonds in Table 1, Panel A. Bond A is a high credit quality five year bond. For a flat Treasury term structure of 3% and a 300 basis point credit spread, Bond A has an annual coupon and par yield of 6%. Meanwhile, Bond B is a low credit quality five year bond with a 700 basis point credit spread and so has an annual coupon and par yield of 10%. Comparing Panel B with Panel C, we note that a 200 basis point decrease in the Treasury term structure has precisely the same price response as a 200 basis point tightening of the credit spread. Moreover, as Panel D illustrates, the credit spread for a given bond can improve due to a credit rating upgrade rather than a general tightening of credit spreads so that investors can obtain an increase in bond price due to credit events specific to the

firm. Assuming that share prices are inversely correlated with credit spreads; a narrowing of the credit spread will be associated with a share price increase. Then the firm will gain financial advantage by issuing by selling cheap shares to call back expensive claw back bonds.

Table 1 also illustrates the traditional justification for ordinary callable bonds because shareholders will gain in Panel B if they are able to call the bond at par as the level of interest rate falls to 1%. Therefore, one possible reason why claw back bonds exist is to span the market by enabling firms to exploit their advantage in forecasting general credit conditions or firm specific credit quality improvements just as some firms can potentially take advantage of their ability to anticipate a fall in the level of interest rates by issuing ordinary callable bonds.

<< Table 1 about here >>

Of course, this motivation for issuing claw back bonds does require that firms must have some private information concerning credit conditions just as firms issuing ordinary callable bonds must have some special ability to forecast interest rates. Otherwise, what appears to be a bond contract term that benefits shareholders *ex post*, can well be anticipated by bondholders who expropriate them in the initial terms of the bond contract. Therefore we examine the pricing of callable and non-callable bonds to determine whether firms pay a premium for issuing a given type of bond relative to all other types.

The literature concentrates on agency theoretic explanations for the use of the claw back and ordinary call provisions. Goyal et al. (1998) and Daniels (2009) find that small firms with lower ratings and modest profitability, precisely the sort of firms that experience more sever agency problems, favor claw back bonds. Banko and Zhou (2010) find that the classic call option is used to resolve a combination of asymmetric information and underinvestment problems.

Meanwhile, make whole bonds are designed such that they cannot be called to take advantage of a fall in interest rates, credit spreads or an improvement in credit rating as the call price is set relative to the current level on interest rates and a constant credit spread. Evidently, make whole callable bonds are meant to reassure bond investors that the bond will be called only for operational reasons, say to eliminate a debt overhang, and not to exploit an informational advantage. There is substantial empirical evidence in the literature that supports this view. Survey evidence in Mann and Powers (2003b) and Powers and Sarkar (2006) find that corporate executives believe that make-whole call provisions offer tangible benefits to the firm in the form of increased financial flexibility. Nayar and Stock (2008) find that firms that issue make whole bonds actually obtain tangible benefits as they experience superior post issue stock returns and analysts forecast higher post issue growth for firms issuing make whole bonds.

However, the agency theoretic explanations for claw back and ordinary callable bonds and the debt overhang explanation for make whole bonds are static in nature and do not explain the well documented time series variations in the popularity of different types of call provisions. Kalotay (2008) and Banko

and Zhou (2010) observes that the portion of ordinary callable to all bond issues have been declining over the last 20 years and its popularity has shifted towards the below investment grade segment of the corporate bond market. In contrast, our more recent sample finds that callable bonds are becoming increasingly popular. Meanwhile Goyal et al. (1998) and Daniels (2009) document the increasing popularity of claw back bonds. Clearly, there are additional considerations that influence the popularity of the different types of callable bonds; a gap that we intend to address. Therefore, we develop a much larger set of hypothesis and test them in an attempt to explain why the popularity of different types of call provisions change.

Among the highlights of our results is the discovery that the popularity of ordinary callable bonds is decreasing in the level and slope of the term structure and the credit spread whereas the popularity of non-callable bonds is increasing in the level and slope of the term structure, interest rate volatility and the credit spread. High credit quality firms prefer to float large issues of simple non-callable bonds with no restrictive or strong security features. Banks prefer ordinary callable bonds without restrictive features and without strong security. Make whole and claw back bonds contain restrictive covenants and have a high security level and are issued by smaller firms via private issue or by negotiation. Correcting for self-selection bias, issuers of make whole bonds are rewarded with a discount relative to the offer spread of all other types of bonds for eliminating the possibility of calling the bond for financial advantage. Relative to make whole bonds, the offer spreads on all other types of bonds are higher with claw backs being the most and non-callable bonds being the less expensive.

1. Reasons for different types of callable bonds

We do not know why the popularity of different types of call provisions varies through time. Clearly, there is more to the dynamics of the callable bond market that we can, at present, explain. Below we explain our hypotheses concerning the issue characteristics of claw back, make whole, ordinary callable and non-callable bonds. Specifically, we group our hypothesis into five factors, the Economic Environment, Asymmetric Information, Funding Costs, Agency Costs and Debt Overhang. Table 2 provides a summary of our detailed hypothesis. Note that our hypothesis are not necessarily mutually exclusive so that a variable such as COMPANY SIZE primarily associated with Funding Costs for non-callable bonds can also be associated with Agency Costs for claw back bonds.

<<Table 2 about here>>

A. Economic Environment

Changes in the economic environment can explain the time varying popularity of callable versus non-callable bonds because changes in the level, slope and volatility of the term structure and changes in the credit spread implies that the costs and benefits of each type of call provision will vary. If interest rates mean revert then the a rise in interest rates suggest that ordinary callable bonds will become more popular because as interest rates later fall the bond can be called to benefit the firm's shareholders.

Similarly, Estrella and Mishkin (1997) find that increases in the slope of the term structure are associated with increases in anticipated inflation while Estrella and Mishkin (1998) and Ang et al. (2006) also find that decreases in the slope of the term structure foreshadows a fall in interest rates. This suggests that an increase in the slope of the term structure can foreshadow a rise in interest rates. Therefore as the slope of the term structure rises, ordinary callable bonds issues will be less popular as fewer firms expect to benefit by calling them.

As illustrated in Table 1, claw back and ordinary callable bonds can benefit from a narrowing of the credit spread. Van Horne (2001) suggests that there is a credit cycle that is coincident with the economic cycle. This implies that like interest rates, the credit spread can mean revert so that as the credit spread increases more callable bonds are issued as issuers hope to benefit by calling them later once the credit spread narrows. We expect this positive association between callable bonds and the credit spread to be strongest for claw back bonds as the claw back bond is specifically designed to benefit from a narrowing of the credit spread.

However, bondholders can anticipate any and all of the above events and negate the present value of expected shareholder benefits by charging a higher initial coupon rate and call premium. Indeed, bondholders can require a call risk premium in response to say, a rise in interest rates, so that firms issue cheaper non-callable bonds instead. Therefore a rise in the level of interest rates, an increase in the slope of the term structure and an increase in the credit spread could be directly or inversely related to more issues of callable bonds. In any event, non-callable bonds are a close substitute for callable bonds so if we observe say a direct relation between the level of interest rates and ordinary

callable bonds we would then expect to see an inverse relation between interest rates and the popularity of non-callable bonds.

Shelf registered bonds are bonds that can be issued quickly in response to market events as most of the detailed information requirements are already filed with regulatory authorities. If firms do time the issue of ordinary callable and claw back bonds in response to changes in the term structure and/or credit spread then their ability to do so will be enhanced by employing shelf registered bonds. Therefore, if issuers try to time the issue of ordinary callable and claw back bonds they are likely to be shelf registered bonds. Conversely, there appears to be no rationale why issuers would attempt to time the issue of non-callable bonds so we expect that non-callable bonds are unlikely to be shelf registered bonds.

In contrast, make whole bonds are specifically designed to eliminate any financial advantage for calling in response to a change in the level, slope or credit spread. Therefore, a rise in any of these three factors will discourage new issues of make whole bonds as it will be more costly to exercise the call provision. Similarly, the popularity of callable bonds should be inversely related to interest rate volatility. All else equal, a rise in interest rate volatility implies an increase in call risk for bondholders without any obvious benefit for shareholders. Therefore, as interest rate volatility rises all types of callable bonds are discouraged as call risk premiums rise whereas non-callable bonds are encouraged as they are likely to be the cheaper choice.

B. Asymmetric information

A review of the factors related to a changing economic environment reveals that some of the signs of economic factors are ambiguous. We can obtain more definitive hypotheses however, once we recognize that certain types of firms have a special advantage in processing economic information. Specifically financial firms that perform the banking function, that is borrowing money at low rates of interest, usually at short terms, and then lending this money at higher, often at fixed interest rates, for longer terms, are vitally concerned with changes in the interest rate environment. If these types of firms develop special expertise in forecasting interest rates, then they can, on average, be able to derive economic benefits from issuing ordinary callable bonds. Therefore, we expect that banks are more likely to issue ordinary callable bonds than firms in other industries. Alternatively, banks can issue ordinary callable bonds as interest rate risk is of vital concern and so issue callable bonds to ensure they can manage the spread between lending and borrowing rates.

As is illustrated in Table 1, Panel D, low credit quality firms are more likely to benefit from claw back bonds as the credit spread can narrow due to a credit rating improvement as well as the general tightening of credit spreads. Moreover, small firms can have asymmetric information concerning the firm's future earnings prospects. It is possible that they can anticipate a credit rating improvement. Therefore low rated, small firms are more likely to issue claw back bonds.

C. Funding costs

While the recent literature concentrates on callable bonds, it does not discuss the reasons why non-callable bonds are issued. As a first step towards understanding why firms would issue non-callable bonds, we propose that the driving force is the need to obtain funding at a minimal cost. Firms can minimize the cost of debt by enhancing the liquidity of its bonds. Therefore, we expect that non-callable bonds are the simplest bonds that are easiest to value and trade.

Consequently, it is unlikely that non-callable bonds would contain restrictive covenants and high security features that can impede simple valuation. To reduce liquidity premiums, it is likely that straight bonds would be issued in larger amounts. It is more likely that large, high credit quality, profitable firms would be in a privileged position to take advantage of the non-callable bond market by being able to float large issues of simple, low security bonds. In turn, this suggest that if large, high credit quality, profitable firms who have good access to capital issue non-callable bonds then non-callable bonds are unlike to resort to less liquid private issues. Large firms are more likely to need fairly continuous access to the bond market so non-callable bonds are more likely to employ term notes. Large, high credit quality, profitable firms issuing simple bond contracts will likely find that issuing the bonds via competitive bids rather than negotiated offers the cheaper option because simple bond contacts leave fewer topics for negotiation and well received competitive bids can reduce the offer spread.

D. Agency Costs

It is well noted in the literature that small, modestly profitable, low credit rating firms have restrictive access to capital and suffer from agency problems. According to Goyal et al. (1998) and Daniels (2009), claw back bonds can alleviate some agency problems. Therefore, we expect that small, low profit and low credit rating firms will favor claw back bonds that are issued privately. Investors in bonds of small, low profit and low credit rating firms will likely require higher security and restrictive covenants to protect their investment so we expect that claw back bond will likely contain restrictive and high security covenants. Since this suggests the bond contract is complex, the initial issue is likely to be sold via negotiation rather than competitive bid.

E. Debt overhang

Mann and Powers (2003b) and Powers and Sarkar (2006) suggests that make whole bonds are used by firms that desire financial flexibility for operational reasons such as relieving the debt overhang problem caused by restrictive covenants. Therefore, it is likely that make whole bonds contain restrictive covenants and high security. This means the bond contract will be complex requiring negotiation with investors so the bond is likely to be issued via negotiation rather than competitive bids.

2. Data selection

We use the Mergent® Inc's Fixed Investment Securities Database FISD. The FISD consists of detailed cross sectional information on issue characteristics of all bonds that the National Association of Insurance Commissioners had on their books as of January 1, 1995, and all bonds that they bought up to and including May 27, 2008. Each of the approximately 100,000 bond issues is identified by the ISIN number and includes information on the maturity date, offering date, rating date, rating, rating type, offering amount, industry code and type of call provision.

From the FISD, we select all bonds that were issued on or after January 1, 1995 because prior to that date the NAIC had to backdate old issues in order to add them to the database. It is possible that bonds that have since matured prior to January 1, 1995 were not included so use of these backdated bonds may introduce some unknown survivorship bias. We select all bonds that belong to the industrial, financial, and utility industries while we eliminate Treasury bonds. Therefore our sample contains corporate bonds only. We select only fixed coupon bonds as we wish to concentrate on the straightforward choice among callable and non-callable bonds. On examining these corporate bonds for rating type we find that Duff and Phelps do not rate many bonds within each rating category. Moreover, virtually all bonds rated by Duff and Phelps are also rated by one of the other mainstream rating agencies, so we decide to neglect Duff and Phelps ratings. However, we consider all Standard and Poor's, Moodys and Fitch rated bonds because they rate a large number of bonds in all

industry categories.[1] We only keep bonds with a rating date within one year of the offering date to ensure that the bond under study has the same rating it had on the date it was offered. To report the characteristics of the sample by rating we convert Standard and Poors, Moodys and Fitch letter ratings into numerical equivalents from 21 (AAA) to 1 (C or D).[2]

From this initial selection of bonds we select four sub samples, the claw back, make whole, ordinary callable and straight bond sub samples. The claw back sub sample consists of bonds that contain a claw back provision but does not contain any other type of optionality such as a make whole, ordinary call, put provision and so on. Similarly, the make whole and ordinary callable bonds have make whole and ordinary call provisions respectively but do not contain any other type of optionality. Finally, non-callable bonds are bonds that do not contain a claw back, make whole or ordinary call provision or any other type of optionality. This helps ensure that we are dealing with "pure types" so that we are clearly focused on the choice amongst the various types of callable and non-callable bonds.

These selection procedures leave a total sample of 10,028 bonds consisting of 979 claw back, 3,205 make whole, 2,816 ordinary callable bonds and 3,028 straight bonds. Table 3 reports the details of the make whole, claw back and otherwise callable sub samples.

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[1] We neglect bonds that were not rated as only very few bonds, less than 20, have no rating by one of the three rating agencies, and it is not clear how these bonds can be included in later regressions where the credit ranking appears as a key independent variable.

[2] All rating agencies have an almost identical rating system with eight broad rating categories, six of which are sub divided into three shades of ratings. At the lower end there appears to be a minor deviation where Standard and Poors has one lower rating D and Fitch has two additional lower ratings of DD and DDD than Moodys so that in total Moodys has 21, Standard and Poors 22 and Fitch 24 ratings. However this deviation is minor as very few bonds have a rating of D, DD or DDD within one year of issue so we simply assign the same numerical rating of one to Moodys' rating of C, Standard and Poors' ratings of C and D, and Fitch's ratings of C, D, DD and DDD.

<<Table 3>>

Table 3 reveals three notable characteristics of our sample of callable and non-callable bonds. First, examining the sub samples of bonds by industry, we note that while make whole bonds are popular in all industries, claw back bonds are popular in the industrial category and ordinary callable bonds are popular in the financial industry. Second, ordinary callable and straight bonds have higher ratings than make whole and claw back bonds in all industries. Specifically, make whole bonds tend to be rated one notch lower than ordinary callable bonds and claw back bonds at least three notches or more lower than ordinary callable bonds. Clearly, the low ratings of claw back bonds noted by Goyal et al. (1998) and Daniels (2009) are replicated in our sample. Third, we note that in all industries, non-callable bonds tend to have much shorter scheduled maturities than their callable bond counterparts. Since the actual maturity of callable bonds is likely to be shorter than the scheduled maturity, one should be cautious in drawing conclusions about differences in scheduled maturity. Nevertheless, it is notable that ordinary callable bonds and make whole bonds have a much longer average maturity than claw back provision bonds. Bali and Skinner (2006) note that the average maturity of corporate bonds typically declines with credit rating. Evidently, much of this difference in average maturity is accounted for by the differences in average credit rating since as noted above; the credit rating of claw back bonds is at least three notches lower than the credit rating of ordinary callable bonds.

Banko and Zhou (2010) and Crabbe and Helwege (1994) amongst others note that the use of call provisions vary through time. To examine the trend in the

use of non-callable and various types of callable bonds we plot the portion of bonds of each type relative to all types of bonds by offering year in Figure 1. Note that the portions are calculated as the number of bonds of a particular "pure" type relative to the total number of "pure" straight, claw back, make whole and ordinary callable bonds offered in a given year Moreover, we end the figure in 2007 as our 2008 information ends part way through the year and so is not directly comparable with the earlier full years.

<<Figure 1 about here>>

Figure 1 shows that starting from a dominate position, the number of "pure" new issue non-callable bonds relative to the sum of all "pure" non-calable, claw back, make whole and ordinary callable new bond issues declines almost continuously throughout the January 1, 1995 to December 31, 2007 period. From modest beginnings, make whole and ordinary callable bonds become popular reaching 30 to 50% of all bonds towards the latter half of the sample period. Meanwhile, claw back bonds remain a rather small, albeit steady segment of the new issue market. Clearly, the new issue market exhibits variations in the popularity in the types of bonds issued through time, a phenomenon that this paper seeks to shed light upon.

4. Model development

The FISD contains variables that indicate the presence of the full range of bond covenants including protective and restrictive bond features and the security level. There are also indicator variables for exchange listing and for

private placement of the bond issue. As bond market and firm level data is not available from the FISD we employ three additional sources of information. Treasury market information is collected from the Federal Reserve Bank of New York and other bond market information is collected from DataStream. We also collect firm level information from Bloomberg. The Bloomberg database contains financial statement information that can be linked to the FISD bond information via the nine-digit CUSIP numbers.[3]

We collect the one and ten year constant maturity Treasury interest rates from the Federal Reserve Bank of New York, Table H6. We proxy the level of the term structure as the one year rate and the slope of the term structure as the difference between the ten year and one year rates. We collect at the money 5 year cap rates and the yield on the Merrill Lynch high yield index from DataStream. At the money caps represent the implied volatility from five year interest rate caps and are our proxy for interest rate volatility. The difference between the yield on the Merrill Lynch high yield index and the one year Treasury rate is our proxy for the credit spread on the bond market.

We wish to determine the variables that influence the popularity and the pricing of claw back, make whole, ordinary callable and straight bonds. As we discuss in section 3, firms will self-select bonds of a given type based on the economic environment, asymmetric information and funding requirements so we must adjust our inquiry for self-selection bias. Heckman (1979) provides the methodology for dealing with self-selection bias by treating the problem as a case of an omitted variable. We follow Heckman's (1979) two stage least

[3] In performing the match of the Bloomberg data with the FISD database we gratefully acknowledge expert help from the staff of Bloomberg data. All of the subsequent matches made by CUSIPS were double checked by matching company names.

squares procedure by first running a probit selection equation to extract the inverse mills ratio and then use the mills ratio as an independent variable in an OLS valuation regression. The inverse mills ratio then serves as a correction for self-selection as it measures the unexplained factors that led to the selection of a given bond type. This omitted variable is then added to the pricing equation to then measures the influence self-selection has on bond pricing. These procedures have become increasingly popular in the literature and good examples can be found in Kwan and Carleton (2010) and Daniels et al. (2009).

Our selection equation investigates determinates of the popularity of different bond types and the pricing equation, corrected for self-selection bias, investigates determinates of the pricing of different bond types. The selection equation is

$$P(BT_i = 1)_j = F(\text{Constant} + LEVEL_i + SLOPE_i + VOLATILITY_i + CREDIT\,SPREAD_i + SHELF_t + BANK_i + COMPANY\,SIZE_i + AMOUNT_t + TERM\,NOTE_t + COMPETITIVE_t + PRIVATE_t + SECURITY_t + RESTRICT_t + RATING_t + ROA_t + DR_t + QR_t + \varepsilon_i) \quad (1)$$

Where i refers to a given bond where BT = 1 if the bond is on type j, being zero otherwise. Therefore there are 4 probit models where if say j =1 and BT = 1, i is a claw back bond, zero otherwise and again another probit model where if j = 2 and BT =1, i is a make whole bond, zero otherwise and so on for the additional probit regressions for ordinary callable and non-callable bonds. All variables are defined in Table 4 and are designed to test out hypotheses discussed in Section 3 and summarized in Table 2. Note there are two additional control variables in (1) because a critical variable, credit rating, is an imperfect proxy for the credit worthiness of the company issuing the bond. Therefore we

include the company's total debt ratio TD and quick ratio QR to measure the total debt burden and liquidity of the firm that issued the bond.

<<Table 4 about here>>

We estimate four versions of the above selection equation, one each for make whole, claw back, ordinary callable and non-callable bonds, using maximum likelihood probit regressions for the full sample of 10,028 observations. The standard errors are corrected for heteroscedasticity. From each of the above probit regressions we extract the inverse mills ratio.

The pricing equation contains the variables that we expect to determine

$$(Y_i - Y_m) = \text{Constant} + \beta\text{SECURITY}_t + \beta\text{RESTRICT}_t + \beta\text{RATING}_t + \beta\text{SHELF}_t + \beta\text{PRIVATE}_t + \beta\text{COMPETITIVE}_t + \beta\text{FINANCIAL}_i + \beta\text{UTILITY}_i + \beta\text{COMPANY SIZE}_i + \beta\text{ROA}_t + \beta\text{DR}_t + \beta\text{QR}_t + \beta\text{SLOPE}_i + \beta\text{MILLSCB}_t + \beta\text{MILLSMW}_t + \beta\text{MILLSOC}_t + \beta\text{MILLSNC}_t + \varepsilon_i) \quad (2)$$

the offer spread.

Where $(Y_i\text{-}Y_m)_i$ is the offer spread, that is the difference between the offering yield for a given bond i and the yield on corresponding maturity m Treasury bond, MillSCB, MillSMW, MillSOC and MillSNC, are the estimated inverse mills ratios from (1) for the claw back, make whole, ordinary callable and non-callable bond probit regressions and all other variables are as previously defined. Additionally, we include two industry dummy variables, FINANCIAL and UTILITY because the systematic risk of the financial, utility

and industrial company sectors can be different and so influence the offer spread. Also, we exclude the LEVEL and CAP5Y because of high collinearity problems.[4]

5. Empirical results

Table 5 reports the result of the selection equation (1) and is meant to shed light on what determines the characteristics and the type of a bond a firm will issue. Note that overall, all probit regressions seem to explain the data reasonably well with a minimum R-square of 35%. Moreover, of the 35 signed hypothesis summarized in Table 2, 29 of them are of the correct sign and significant. Only in one instance, SHELF for claw back bonds are the coefficients of the incorrect sign and significant.

<< Table 5 about here>>

A. Economic Environment

The first five variables, from LEVEL to SHELF, examine the influence of the economic environment on bond issue choice. Clearly, the higher the current (LEVEL) and anticipated (SLOPE) interest rate, the more likely non-callable bonds are issued in preference to ordinary callable bonds. This suggests that bond investors anticipate mean reversion so that higher rates of current and futures interest rates imply that, eventually, the bonds will be called to the

[4] LEVEL, SLOPE and CAP5Y are all highly correlation with each other, almost 0.9 in all cases. Including two or more of these variables in (2) result in classic collinearity problems.

financial advantage of the firm. Evidently, firms are discouraged from issuing callable bonds as call risk premiums rise in anticipation of future lower rates and so issue non-callable bonds instead. Similarly, as volatility rises, the call option embedded in callable bonds becomes more expensive making non-callable bonds the more attractive funding option. Corroborating evidence is found by examining the popularity of make whole bonds. As these bonds are designed to make sure shareholders will not benefit from calling in response to fall in interest rates we observe that a rise in the LEVEL, SLOPE and VOLATILITY reduces the likelihood that a make whole bond will be issued.

As we expect, increases in the CREDIT SPREAD encourages the issue of claw back bonds but perversely discourages the issue of ordinary callable bonds. The reason for this perplexing result can be found by re-examining Table 4. Note that claw back bonds are below investment grade whereas ordinary callable bonds are investment grade. As illustrated in Table 1, the price of lower grade bonds have more room for improvement in response to a change in the credit rating than higher rated bonds so the influence of the credit spreads is strongly felt for below investment grade claw back bonds. Given the investment grade of ordinary callable bonds however, there is less room for improvements in the price through changes in the credit rating. Moreover, due to mean reversion, if there is a higher likelihood of call as the credit spread widens, firms can be discouraged to issue ordinary callable bonds as bond investors can be adding a higher call risk premium. In turn, this explains the related positive CREDIT SPREAD coefficient for non-callable bonds. If non-callable bonds are close substitutes for ordinary callable bonds, then as the CREDIT SPREAD

widens, non-callable bonds become more popular as callable bonds become less popular.

Finally, we note that issuers of ordinary callable bonds do use shelf registered bonds whereas issuers of non-callable bonds do not. This provides evidence that issuers of ordinary callable bonds are timing the issue of these bonds, waiting for the "right" economic environment to issue these bonds. It is interesting that issuers of non-callable bonds do not appear to time their issues possibly because high credit quality firms always need to fund their operations and for them, non-callable bonds always provide a viable alternative irrespective of the economic environment. Unexpectedly, claw back bonds do not use shelf-registration possibly because it is hard to anticipate in advance the restrictive covenants private investors will require.

B. Asymmetric information

The variables BANK and COMPANY SIZE predominately proxy for the effect of asymmetric information. In section 3 we suggest that banks can develop an informational advantage in processing interest rate information and so would favor issuing ordinary callable bonds either because they can expect to achieve financial advantage by selling undervalued call options embedded in ordinary callable bonds or to manage interest rate risk. Clearly, Table 5 provides strong support as the Bank coefficient is positive and highly significant for ordinary callable bonds. Moreover, we suggest that small firms can have an information advantage concerning the likelihood of credit rating improvements and so would favor issuing claw back bonds. Again we observe strong support

because the likelihood of issuing a claw back bond inversely related to firm size.

C. Funding costs

We expect that the next three variables, AMOUNT, TERM NOTE, and COMPETITIVE will be directly associated with non-callable bonds if the primary purpose of non-callable bonds is to raise funds cheaply. Table 5 reports that all of these coefficients are positive, and two of them, AMOUNT and TERM NOTE are significant. Five other variables, PRIVATE, RATING, ROA, SECURITY and RESTRICT, are all highly significant and have the signs that we expect. Taken together, these variables say that highly rated, profitable firms are likely to regularly float large issues of simple non-callable bonds to the public. This implies that non-callable bonds are issued by firms wishing to minimize funding costs.

D. Agency Costs/Debt Overhang

Firms that suffer most from agency costs are expected to be low rated, modestly profitable firms that favor issuing bonds privately. Table 6 shows that low rated firms (RATING) tend to issue claw back bonds privately (PRIVATE) so we have clear evidence that claw back bonds can be used to deal with agency costs. Further evidence is provided by the secondary characteristics of claw back issues. Claw backs are issued by relatively small firms (COMPANY SIZE) who are thought to be prone to agency problems. To protect themselves from agency problems, bondholders insist on restrictive covenants (RESTRICT) and

high security (SECURITY) and both of these variable are significantly associated with claw back bonds.

Table 6 provides strong evidence that make whole bonds are meant to provide flexibility in dealing with the debt overhang problem. RESTRICT and SECURITY proxy for bond covenants that can later prove to be onerous by inhibiting the operations (RESTRICT) or the refinancing (SECURITY) of the firm. Both coefficients are positive and highly significant meaning that make whole bonds are likely to contain restrictive covenants and a high level of security. This suggests that make whole bonds can be replaced via call with a new bond issue with less restrictive covenants without raising concerns from bond investors that they will lose out financially during the call.

E. Pricing

Table 6 reports the result of the pricing equation (2) and is meant to shed light on what determines the offer spread for corporate bonds. A special feature of (2) is the inverse mill ratio coefficients which shed light on the relative price paid by issuers for various types of bonds. All coefficients are statistically significant and all of these have reasonable signs. Specifically, the offer spread decreases in SECURITY, restrictive covenants (RESTRICT) and RATING. Issue processes meant to reduce the cost of funds such as using a shelf prospectus (SHELF) and employing a competitive bid (COMPETITIVE) reduces the offer spread whereas selling to private investors (PRIVATE) increases the offer spread. FINANCE companies pay a higher and utilities (UTILITY) a lower offer spread than industrial firms. Meanwhile, larger firms

(COMPANY SIZE) with higher return on assets (ROA) and liquidity (QR) pay a lower offer spread whereas firms with higher debt burdens (DR) pay a higher offer spread. As the SLOPE of the term structure rises, possibly foreshadowing higher rates of interest, offer spreads increase.

Importantly, the inverse mills ratios are all statistically significant. For claw backs, the positive coefficient means that issuers of claw backs must pay a premium for the ability to call bonds should credit conditions improve. This finding confirms Daniels et al. (2009) who also find a positive inverse mills ratio for claw back bonds. Interestingly, we find that issuers of make whole bonds are rewarded with lower credit spreads. This finding corroborates Nayar and Stock (2008) who find that firms that issue make whole bonds enjoy an initial positive stock price reactions followed up by long run superior performance. Evidently, all investors find that make whole bonds are attractive contracts as they preserve financial flexibility without confounding bond investors with call risk. Daniels et al. (2009) find that firms pay a higher offer spread for issuing ordinary callable bonds just as we do and that other than make whole bonds, the cheapest bond to issue are non-callable bonds.

6. Summary and Conclusions

Overall we find that factors related to the Economic Environment, Asymmetric Information, Funding Cost, Agency Theory and the Debt Overhang problem can explain the popularity of claw back, make whole, ordinary callable and non-callable bonds. We find that indeed the popularity of callable versus non-callable bonds is influenced by changes in the economic environment.

Increases and forecast increases in interest rates and increases in interest rate volatility discourage callable and encourage the issue of non-callable bonds possibly because call risk premiums rise making non-callable bonds the cheaper funding choice.

We also note that firms that can have a special ability to process particular types of economic information do issue bonds that appear able to exploit this information. Banks are vitally interested in changes in interest rates and so are likely to issue interest rate sensitive ordinary callable bonds. Two possible reasons why the popularity of claw back bonds increase in the credit spread is because high credit spreads may mean revert and claw back bonds are issued by small, low rated firms who have private information concerning their credit upgrade prospects.

Low funding costs seem to be the driving force behind issues of non-callable bonds. Non-callable bond contracts are simple contracts without restrictive covenants and high security levels. They are issued in large amounts by high credit quality firms to the public. These measures can encourage the secondary trading thereby lowering liquidity premiums.

We also find support for existing explanations of callable bonds. Clearly at least part of the demand for claw back and make whole bonds are caused by agency theoretic considerations. Claw backs are issued privately by small, low credit quality firms, just the sort of firm where agency problems are most sever. Moreover, claw back contracts typically include restrictions and high security levels, just the sort of clauses we expect investors to demand to protect themselves from agency conflicts. Finally, make whole bonds appear to be popular with firms that need financial flexibility to overcome a possible debt

overhang problem should existing restrictive covenants later prove to be onerous.

Firms issuing make whole bonds are rewarded by investors for eliminating the possibility of calling for financial advantage because once we control for self-selection bias we find that the offer spread is lower than the offer spread for other types of bonds. Meanwhile firms issuing claw backs and ordinary callable bonds must pay for the privilege as the offer spread is high than the offer spread of other types of bonds. Other than make whole bonds, the cheapest bond to issue are non-callable bonds.

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Table 1.

This table illustrates that corporate bond prices can respond to general credit spread improvements and credit quality upgrades in the same way as interest rate decreases.

	Panel A: Initial conditions	
Bond	A	B
Coupon	6%	10%
Maturity	5	5
Yield	6%	10%
Treasury	3%	3%
Credit Spread	3%	7%
Price	$100	$100
	Panel B: Interest Rate Shift	
Bond	A	B
Coupon	6	10
Maturity	5	5
Yield	4%	8%
Treasury	1%	1%
Credit Spread	3%	7%
Price	$108.90	$107.99
	Panel C: Credit Spread Shift	
Bond	A	B
Coupon	6	10
Maturity	5	5
Yield	4%	8%
Treasury	3%	3%
Credit Spread	1%	5%
Price	$108.90	$107.99
	Panel D: Credit Rating Shift	
Bond	AAA	BBB
Coupon	6	10
Maturity	5	5
Yield	4%	7%
Treasury	3%	3%
Credit Spread	1%	4%
Price	$108.90	$112.30

Table 2. The hypothesized relations between bond issue characteristics and issues of claw back, make whole, ordinary callable and straight bond

Factors/Variables	*Claw back*	*Make whole*	*Ordinary callable*	*Non-callable*
Economic Environment				
LEVEL	N/A	Negative	Positive/Negative	Negative/Positive
SLOPE	N/A	Negative	Positive/Negative	Negative/Positive
VOLATILITY	N/A	Negative	Negative	Positive
CREDIT SPREAD	Positive/Negative	Negative	Positive/Negative	Negative/Positive
SHELF	Positive	N/A	Positive	Negative
Asymmetric Information				
BANK	N/A	N/A	Positive	N/A
COMPANY SIZE	Negative	N/A	N/A	N/A
Funding Costs				
RESTRICTIVE	N/A	N/A	N/A	Negative
SECURITY	N/A	N/A	N/A	Negative
AMOUNT	N/A	N/A	N/A	Positive
COMPANY SIZE	N/A	N/A	N/A	Positive
PROFITABILITY	N/A	N/A	N/A	Positive
RATING	N/A	N/A	N/A	Positive
PRIVATE	N/A	N/A	N/A	Negative
TERM NOTE	N/A	N/A	N/A	Positive
COMPETITIVE	N/A	N/A	N/A	Positive
Agency/Debt Overhang				
COMPANY SIZE	Negative	N/A	N/A	N/A
ROA	Negative	N/A	N/A	N/A
PRIVATE	Positive	N/A	N/A	N/A
RATING	Negative	N/A	N/A	N/A
SECURITY	Positive	Positive	N/A	N/A
RESTRICT	Positive	Positive	N/A	N/A

Table 3. Sample Characteristics

	Industrial					*Financial*					*Utility*					*All*
Grade	Claw Back	Make Whole	Ordinary Call	Non-Callable	Sub Total	Claw Back	Make Whole	Ordinary Call	Non-Callable	Sub Total	Claw Back	Make Whole	Ordinary Call	Non-Callable	Sub Total	Grand Total
AAA	0	12	167	81	260	0	3	105	79	187	0	14	12	23	49	496
AA+	0	1	0	14	15	0	3	24	40	67	0	4	0	0	4	86
AA	0	42	5	70	117	0	13	265	16	294	0	8	0	2	10	421
AA-	0	58	18	101	177	0	24	119	27	170	0	47	3	27	77	424
A+	0	135	5	128	268	0	50	32	281	363	0	56	6	33	95	726
A	0	199	247	160	606	0	50	767	79	896	0	120	5	78	203	1705
A-	0	168	4	237	409	0	72	183	259	514	0	102	0	77	179	1102
BBB+	0	269	3	226	498	0	95	143	60	298	0	185	3	74	262	1058
BBB	0	357	6	211	574	0	182	247	208	637	0	170	4	50	224	1435
BBB-	2	236	4	103	345	0	142	177	19	338	0	98	2	26	126	809
BB+	20	106	9	67	202	2	9	37	7	55	0	24	0	5	29	286
BB	42	50	12	45	149	4	5	22	2	33	4	15	0	3	22	204
BB-	88	26	24	31	169	5	0	2	4	11	1	12	0	4	17	197
B+	181	10	34	28	253	14	0	9	6	29	9	6	1	6	22	304
B	228	8	48	15	299	7	0	9	1	17	10	3	1	2	16	332
B-	280	8	33	8	329	2	3	4	0	9	11	1	0	2	14	352
CCC+	46	3	10	2	61	3	0	1	0	4	1	0	0	1	2	67
CCC	13	1	2	0	16	0	0	0	0	0	3	0	0	0	3	19
CCC-	3	0	1	0	4	0	0	0	0	0	0	0	0	0	0	4
CC	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	903	1689	633	1527	4752	37	651	2146	1088	3922	39	865	37	413	1354	10028
Rating	B	BBB+	A-	A-	BBB	B+	BBB+	A	A	A-	B	BBB+	A+	A-	BBB+	BBB+
Maturity	8.97	13.58	14.04	9.32	11.40	8.66	10.63	10.78	4.59	9.02	9.80	14.34	21.28	11.60	13.57	10.76

This table reports the number of bond issues by industry, type and rating during the period January 1, 1995 to May 8, 2008.

Table 4. Variables and Definitions

Variable	*Definition*
OFFER SPREAD	Offer yield less yield on comparable maturity Treasury bond
	Economic Environment
LEVEL	The one year Treasury yield
SLOPE	The difference between the 10-year and one year Treasury interest rates
VOLATILITY	Interest rate volatility as measured by five year at the money caps.
CREDIT SPREAD	The credit spread as measured by the difference between the average yield on the Merrill Lynch high yield index and the one year Treasury yield.
SHELF	A dummy variable that takes on the value of 1 if the bond is a shelf registered bond according to rule 415, 0 otherwise
	Asymmetric Information
BANK	A dummy variable that takes on the value of 1 if the company issuing the bond was a bank, a finance company or a savings and loan company, 0 otherwise
COMPANY SIZE	The log of the issuing company's assets
	Funding Cost
AMOUNT	The amount of a given bond issue.
TERM NOTE	A dummy variable that takes on the value of 1 if the bond is a medium term note, 0 otherwise
COMPETITIVE	A dummy variable that takes on the value of 1 if the bond issue sale was competitive or exchange offered, 0 otherwise
	Agency/Debt Overhang
PRIVATE	A dummy variable that takes on the value of 1 if the bond is a private placement issue according to rule 144a, 0 otherwise
RATING	A 21 point rating scale where AAA is 21, AA+ is 20 and so on until CCC- is 3, CC is 2 and C/D is 1.
ROA	The return on assets of the issuing company
SECURITY	Coded from 1 to 7 in increasing order of security. Junior Subordinate (7), Junior (6), Subordinate (5), None (4), Senior Subordinate (3), Senior (2), Senior Secure (1)
RESTRICT	A dummy variable that takes on the value of 1 if the bond contains a company or subsidiary restrictive covenant or a bond protective covenant, zero otherwise
	Control Variables/ Variables Unique to the Pricing Equation
TDR	The total debt ratio of the issuing company
QR	The quick liquidity ratio of the issuing company
FINANCIAL	A dummy variable that takes on the value of 1 if the company issuing the bond was in the Finance industry, 0 otherwise
UTILITY	A dummy variable that takes on the value of 1 if the company issuing the bond was in the Utility industry, 0 otherwise
MILLS-CB	The inverse mills ratio for claw back bonds
MILLS-MW	The inverse mills ratio for make whole bonds
MILLS-OC	The inverse mills ratio for ordinary callable bonds
MILLS-NC	The inverse mills ratio for non callable bonds

Table 5: Selection Model for Callable and Non-callable bonds

This table reports the variables that determine the popularity of non-callable and various types of callable bonds. All variables are defined in Table 4.

	Claw Back		*Make Whole*		*Ordinary Callable*		*Straight*	
Variable	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
CONSTANT	2.102*	0.876	-2.686***	0.425	5.088***	0.400	-4.783***	0.363
LEVEL	-0.050	0.067	-0.605***	0.033	-0.370***	0.031	0.695***	0.027
SLOPE	0.160*	0.073	-0.547***	0.037	-0.254***	0.037	0.538***	0.033
VOLATILITY	-0.014	0.011	-0.042***	0.005	-0.008	0.005	0.038***	0.005
CREDIT SPREAD	0.103***	0.022	0.011	0.011	-0.074***	0.011	0.023*	0.010
SHELF	-0.297*	0.135	0.979***	0.066	0.195**	0.075	-0.864***	0.059
BANK	-0.486	0.384	-1.303***	0.115	0.440***	0.055	0.088	0.059
COMPANY SIZE	-0.296***	0.031	-0.152***	0.013	0.099***	0.011	0.009	0.010
AMOUNT	0.092*	0.045	0.272***	0.015	-0.195***	0.012	0.081***	0.011
TERM NOTE			-1.371***	0.080	0.491***	0.088	1.090***	0.071
COMPETITIVE	-0.405	0.253	-0.717***	0.217	0.682***	0.167	0.158	0.184
PRIVATE	0.587***	0.150	0.325***	0.075	-0.294**	0.096	-0.275***	0.070
RATING	-0.432***	0.017	0.138***	0.007	-0.018**	0.007	0.041***	0.006
ROA	0.008	0.006	-0.010*	0.004	-0.031***	0.005	0.015***	0.004
SECURITY	0.321***	0.081	0.354***	0.042	-0.479***	0.042	-0.102**	0.039
RESTRICT	0.320*	0.136	0.396***	0.068	-0.338***	0.088	-0.157*	0.066
DR	0.001	0.001	0.000	0.001	0.007***	0.001	-0.010***	0.001
QR	-0.007	0.019	-0.021***	0.007	0.094***	0.006	-0.566***	0.027
N	10,028		10,028		10,028		10,028	
CASE CORRECT	9,661		8,523		8,962		8,079	
ON TYPE	979		3,025		2,816		3,028	
PSEUDO R^2	0.573		0.550		0.536		0.353	

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Table 6 Pricing model for Callable and Non-callable bonds

This table reports the variables that determine the offer spread for new issues of all types of bonds. The inverse mills ratios MILLSCB, MILLSMW, MILLSOC and MILLSNC report the difference in the offer spread for the claw back, make whole and ordinary callable bond and non-callable bonds respectively relative to all other types of bonds. All variables are defined in Table 4.

Variable	*Coefficient*	*Standard Error*
CONSTANT	6.836***	0.340
SECURITY	-0.115*	0.046
RESTRICT	-0.380***	0.060
RATING	-0.356***	0.024
SHELF	-0.489***	0.053
PRIVATE	0.315***	0.063
COMPETITIVE	-0.446*	0.176
FINANCE	0.133***	0.033
UTILITY	-0.171***	0.035
COMPANY SIZE	-0.073***	0.014
TDR	0.007***	0.001
QR	-0.066*	0.027
ROA	-0.020***	0.004
SLOPE	0.140***	0.016
MILLSCB	0.302***	0.054
MILLSMW	-0.202***	0.032
MILLSOC	0.197***	0.052
MILLSNC	0.118*	0.049
N	10028	
R2	0.576	

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Figure 1 The proportion of new issues of bonds by type relative to all types of bonds by year from 1995 to 2007.