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Analysis of Floating Rate Bonds and the Firm Characteristics: Evidence from the Stock Price Reaction

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Abstract

We examine the security and firm characteristics of a sample of 2,027 non-convertible investment grade floating rate securities (bonds) issued by the US based firms between 1980 and 2018. These bonds pay a coupon based on short term reference rate, such as fed funds rate, plus a fixed quoted margin. Considerable number (81.6%) of these issues are between 1992 and 2007 signifying floating rate as an effective mechanism to mitigate firm's interest rate risk when the rates are high and expected to fall. A positive and significant abnormal return (CAR = 0.27%), in the event window surrounding issue date, provides strong evidence that the floating rate is viewed as a less restrictive provision as compared to the call option. Majority of the issues (89.3%) are non-callable since the floating rate mitigates interest rate risk for the issuing firm. Lack of put provision in these bonds (in only 7.35% of the sample issues) signifies no significant investor concerns of falling bond prices. Regression analysis reveals that firms with growth options and with higher leverage experience positive CAR due to the financial flexibility these bonds provide. Firms with higher level of information asymmetry benefits less from issuing these securities since most of these bonds (90.13%) are issued at par therefore, the price is not likely to carry information content that mitigates information asymmetry between the firms and the investors.

Keywords: *Corporate Finance; Financing; Floating Rate Securities; Structured Provisions*

JEL Classifications: *G32; G34; G320*

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Introduction

Floating rate securities (variable rate bonds) are very specialized type of a debt instrument which pays a coupon rate based on the short term reference rate such as fed funds rate plus a quoted (fixed) margin percentage. The quoted margin is typically set based on competitive margins in the markets, the credit risk of the debt security, any option embedded in the bonds, and the liquidity risk of the bonds (Fabozzi, 2016). Typically, the coupon rate on the variable rate bonds is designed to reset several times in a year. Usually, the reset frequency is every quarter. The rate floats in such a manner that there is a hard floor and the ceiling which limits the maximum rate up to which the coupon rate can rise and the minimum level to which it can fall. One key objective of the firms issuing investment grade bonds with structured provision is to mitigate their interest rate risk especially, when the interest rates are high and are expected to fall. One such provision that attempts to achieve this objective is the call option. Presence of call option in bonds gives the firms the right to call the investment grade bonds at a specific price and time when the rates are expected to fall and call the high yield bonds when the yields are expected to fall due to the ratings improvement (Tewari, Byrd, and Ramanlal, 2015). On the other hand, the call provision presents higher reinvestment rate risk for the investors due to a call prior to the maturity (Winn and Hess, 1959). The floating rate bonds address the interest rate risk for the firms through a reset to the lower coupon due to the falling rates and limit the higher coupon due to rising rates through the rate ceiling. The floor on these bonds attempts to mitigate the reinvestment rate risk for the investors due to the lower coupon reset when the rates are falling. These bonds present low price volatility to the investors due to the low duration. Floating rate provision in these bonds likely serves similar purpose for the firms as the call provision in the callable bonds without the restrictions and costs of the complex call provision.

In this paper we examine the bond characteristics of 2,027 non-convertible floating rate investment grade bonds issued between 1980 and 2018 by the US based firms. We only focus on the investment grade bonds since most of the floating rate bonds issued are investment grade bonds, highlighting the fact that the firms generally use these bonds to mitigate their interest rate risk. We also find that majority of these bonds (89.3%) are non-callable which suggests that the firms use floating rates to manage the risk of falling interest rates in place of the call option which, is more restrictive (call premium and call protection period) to the firm. Almost all the bonds in the sample are issued at par.

These bonds have a shorter maturity (sample average 5.1 years). Diamond (1991) states that the quality firms containing private information about their growth options prefer short maturity debt. In addition, firms likely issue short maturity bonds to mitigate the under-investment and asset substitution problems faced by the firms (Nash, Netter, and Poulson, 2003). There is a considerable number (81.6%) of these bonds issued between 1992 and 2007 suggesting that the firms issue these bonds when the rates are high and expected to fall. This observation is in line with Longstaff and Schwartz (1995), who use a valuation framework to show inverse relations between the interest rates and the credit spreads.

We also find that a very small number (149/2027 = 7.35%) of these bonds in our sample have a put provision associated with them. Since the put option is included in the bonds to counter the risk of falling bond prices for the investors, the falling bond prices or the default risk doesn't seem to be a significant concern in these bonds.

We use cumulative abnormal (CAR) around the bond issue date of these firms to assess the market's reaction on the stock price of the issuing firms. We find a significant CAR of 0.27% in the event window surrounding the issue date. In order to study characteristics of the issuing firms, we perform regression analysis by regressing firm characteristics variables on CAR. Smaller firms with low level of information asymmetry, possessing growth options and carrying high leverage are rewarded by the market with a positive stock price reaction. The firms which raise lower amount of principal through these bonds relative to the firm size are also rewarded with a positive stock price reaction.

Rest of the paper is structured as follows: Literature review and hypothesis development; Methodology, sample data and variables; Empirical analysis; and the Conclusion.

Literature Review

Call Option in Bonds

Kish and Livingston (1992) show that the call option embedded in bonds can mitigate information asymmetry. Barnea, Haugen, and Senbet (1980) and Bodie and Taggart (1978) find that the call provision in bonds can address asset substitution issues in the firms possessing growth options. Ederington and Stock (2002) find that the call option could be a positive signaling mechanism when included by the bond issuing firm. According to Tewari et al. (2015), the call premium is included in the investment grade bonds to counter the call risk for the investors when the interest rates are expected to fall and is included in the high yield bonds to counter the call risk due to a ratings improvement.

The call option on the other hand, increases the reinvestment risk for the investors due to the bonds being called away prematurely. Winn and Hess (1959) argue that the presence of the call option increases the likelihood of loss of income for the bondholders. Guedes and Opler (1996) argue that the high-quality firms with call options in the investment grade bonds expose investors to a higher level of reinvestment risk due to a call from maturing growth option or due to declining rates in the high interest rate environment.

Growth Options and Bond Provisions

Firms with growth options highly value financial flexibility in financing their operations (Nash et al.,2003). Restrictive covenants (poison puts, call option parameters etc.) in the bonds can adversely impact this financial flexibility so desired by the firms with growth options to realize those growth options, and the firms facing financial distress, to plan the survival. According to Kahan and Yermack (1998) & Anderson (1999), firms prefer less restrictive covenants in the debt issues which provides them with the necessary financial flexibility, when in possession of maturing growth options. Thatcher (1985) contends that including less restrictive covenants, such as designing a weak call option, can increase financial flexibility for the firms facing financial distress. Begley (1994) contends that the restriction costs due to the presence of restrictive covenants have to be weighed against shareholder wealth maximization. According to Diamond (1991), quality firms with private information on the maturing growth options prefer shorter term debt.

Put Option in Bonds

Put option is attached to the bonds to mitigate the investors' risk of falling bond prices primarily due to some special events. The special events are likely to be firms restructuring (e.g., leveraged buyout) and a rating downgrade by the ratings agencies due to the event (Crabbe, 1991). Usually, it is referred to as the poison put or a super poison put. The put provision allows the investors to put the bond back to the firm at the par value on the specific dates outlined in the bond indenture. In some case the put option is associated with higher coupon reset (Fields, Kidwell, and Klein, 1994).

Inclusion of put provision in bonds has agency implications for the firm. According to Cremers, Nair, and Wei, (2007), the put provision is likely to reduce the agency cost of debt thereby, reducing the financial cost for the firm. Since the presence of put provision is likely to thwart attempts of takeover of the firm, it could lead to the problem of managerial entrenchment (Cook and Easterwood, 1994; Kahan and Klaussner, 1993; Roth and McDonald (1999)). Tewari (2018) finds strong evidence of the presence of managerial entrenchment in the risky firms with outstanding bonds with put provision. The firms with a higher probability of default are likely to face asset substitution problem thereby, worsening the agency problem between bondholders and stockholders. Nash et al. (2003) argue that the firms which include poison and super poison puts attempt to mitigate these issues. Perumpral, Davidson, and Sen (1999) observe negative market reaction to the inclusion of poison put in bonds. Poison put is likely to limit transfer of wealth from bond investors to the firm owners.

Floating Rate Provision

Longstaff and Schwartz (1995) use valuation model to find that the credit spreads in the fixed and floating rate notes are negatively correlated with the interest rates (credit spreads are low during high interest rate environment and vice-versa). They find that effect on the credit spread due to change in the interest rates is more pronounced in the investment grade bonds. Although, majority of the bonds in our sample are issued at par (the sample only has investment grade bonds), Ramaswamy and Sundaresan (1986) finds that the

firms with high default risk sell floating rate bonds at a deep discount. Ramaswamy et al. (1986) also find that even if originally issued at par these bonds can deviate in price from par due to an increase in the credit risk. Morgan (1986) finds that the steeper the term structure of the interest, the lower the duration of the floating rates notes. Bhanot and Guo (2017) finds that the treasury floating rate notes provide positive and significant excess return as compared to the benchmark index on which the quoted margin is based. Fleckenstein and Longstaff (2020) finds that the floating rate notes issued by the US treasury trade for a premium as compared to T-bills & notes due to the near constant price.

Hypothesis: Based on the above discussion, we develop the following hypotheses.

H1: The cumulative abnormal return (CAR) around the issue date of the floating rate bonds is positive since, the floating rate bonds (notes) are less restrictive than the call option (call premium and call protection period) in mitigating interest rate risk in the investment grade bonds especially, in the high interest rate environment.

H2: Firms with high growth options will exhibit positive and significant CAR since, the floating rate bonds provide greater financial flexibility in mitigating interest rate risk for the firms as compared to a more restrictive call option.

Methodology, Sample Data and Variables

Event Study Methodology and Results

The event study methodology used in this study is the standard approach as in Tewari, Ramanlal, Kumar, and De (2019).

The first step involves calculating the daily stock returns from the stock prices obtained from CRSP database. Final sample consists of the firms with the floating rate bonds whose prices are available on CRSP around the issue date of the bonds. Following equation depicts the daily stock returns.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

Where,
R_{it} = the stock return (daily) of stock *i* on day *t*.
R_{mt} = CRSP value-weighted index daily return on day *t*.
The second step is associated with calculating the expected return for the stocks of the issuing firms around the issue date using firm betas. Following equation depicts the expected return ($\hat{R}_{it}$) of stock i on day t.

$$\hat{R}_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt} + \hat{\varepsilon}_{it} \quad (2)$$

Finally, the third step involves calculating the abnormal return and the cumulative abnormal return (CAR) for the stocks of the issuing firms around the issue date. First the abnormal return (AR_{it}) is calculated followed by the CAR during the event window to assess the stock price reaction to the event. Following equations depict the calculations of abnormal return and the CAR.

$$AR_{it} = R_{it} - \hat{R}_{it} \quad (3)$$

$$\mathrm{CAR}_{(t2,t1)} = \sum_{t1}^{t2} AR_t \quad (4)$$

We assess the stock price reaction (CAR), around the issue date, of the stock of the issuing firms using a window of (-1, +4), 6 day window, as in Tewari (2018). Harvey, Lins, and Roper (2004) use a 6 day window to capture the CAR for the bond issue since, the announcement typically occurs on or after the issue date. A narrower window close to the announcement date is not likely to capture the full effect of market's reaction to the issuance. According to Miller (1999), if the announcement precedes the issue date, then observation of market price reaction on the issue date is not likely to be significant. According to Mikkelson and Partch (1986), the measurement of market's reaction to the debt issue on the announcement date could be problematic since there is no guarantee that the debt contract would be completed. The estimation window of [-255, -46] with reference to the issue date is used in calculating expected return, which is the traditional

approach in event studies (Scholes and Williams, 1977). Table 1 depicts results of the CAR analysis. Average CAR for the whole sample is 0.27% which is significant at the 1% level. The results confirm our first hypothesis that the market's reaction to the issuance of these bonds should be positive and significant.

Table 1: Results of the CAR for the sample over (-1, +4) window

Sample	Number of Issues	Average CAR	Z-Statistics	(+) ive:(-) ive	Gen. Sign Z
All issues	2,027	0.27%	2.648***	1208:819	3.005***

***, **, and * indicate significance at the 1%, 5%, and 10% level for one-tailed test.

Sample Data

Sample consists of non-convertible, investment grade (S&P ratings of BBB- and above) floating rate bonds issued between 1980 and the 2018 extracted from SDC platinum database. SDC is used to screen and gather information relating to each issue. The initial screening of the data involves downloading all the bond issues between 1980 and 2018. Data is further screened for the US based firm. All the issues in the City Agencies, Federal Credit Agency, Investment Fund, Mortgage Securities, National Agency, National Government, Non-Government Agency, Regional Agency, Regional Government, and REIT industries are eliminated. All the issues classified as high yield issues are removed and only the investment grade issues are kept. All the convertible issues are eliminated. The data is further screened to keep the floating rate issues and remaining issues are omitted. Firms with multiple issues in the same year are screened and only the first issue of the year is kept in the sample. This is done to preserve the balance of weight of the firms in the empirical analysis and avoid duplication. The issues with any missing data and the issues with maturity less than 18 months are also eliminated. Final criterion for the sample is that the issuing firm's data and the stock prices for the sample time period must be available on COMPUSTAT and the CRSP respectively. Final sample consists of 2,027 non-convertible floating rate investment grade issues by the US based firms. COMPUSTAT is used to gather the information relating to characteristics of the issuing firms. CRSP is used to obtain the stock prices for the event study purposes. Table 2 contains the industry breakdown of the issuing firms. Firms in the financial sector (commercial banks, credit institutions, and investment banks) are the largest issuer of floating rate bonds followed by firms in the manufacturing sector.

Table 2: Industry distribution of the sample

Industry	Number of Issues
Commercial Bank	545
Credit Inst.	270
Electric Service	52
Gas Distribution	5
Healthcare	5
Insurance	35
Investment Bank	720
Leisure	12
Manufacturing	251
Mortgage Bank	1
Natural Resource	21
Oil/Gas Pipeline	5
Other Finance	27
Pers/Bus/Rep Svc	11
Radio/TV/Telecom	11
Real Estate	2
Retail	25
S&L/Thrift	3
Telephone Communication	17
Transportation	7
Wholesale	2
Total	2027

Variables

We use the following issue specific and the firm specific variables in the empirical analysis following the approach in Tewari et al. (2015) and Tewari (2018).

Issue specific variables: The *Treasury* variable captures the treasury rates (interest rates) over the same maturity as each sample issue. The treasury rates for the specific maturities are obtained from the WRDS (Wharton Research Data Service). The *Principal* variable measures the amount of capital raised by the firm through each bond issue. The *Maturity* variable captures the maturity in number of years for each issue. The *Ratings* variable captures the S&P assigned issue rating to each bond issue on the numerical scale with 16 being the highest and the 7 being the lowest, for the investment grade bonds. The approach is identical as in Tewari et al. (2015). Kidwell, Marr, and Thompson (1984) use Moody's rating in their study. Cantor, Packer, and Cole (1997) use the average of Moody's and S&P rating in their analysis. We use S&P bond ratings in our study as in Avramov, Chordia, Jostova, and Philipov (2007).

The *Call* variable is a binary variable (1 or 0) which signifies if the issue is callable. The *Othcov* variable captures presence of other restrictive covenants in the bond issue. According to Billet, King, and Mauer (2007), firms include other covenants in the bonds to address agency issues arising out of bond issuance. Example of other restrictive covenants are sinking fund provision, limitation on additional debt, limitation on additional dividend, subordinate issues, asset collateral, call due to poison pill, and the call by issuing equity. The last issue specific variable used in the empirical analysis is the *Split* variable (binary, 1 or 0) which is the proxy for the presence of information asymmetry. As in Tewari et al. (2015), the *Split* is equal to the value of one is there is a split in the rating assigned to an issue by the S&P and Moody's.

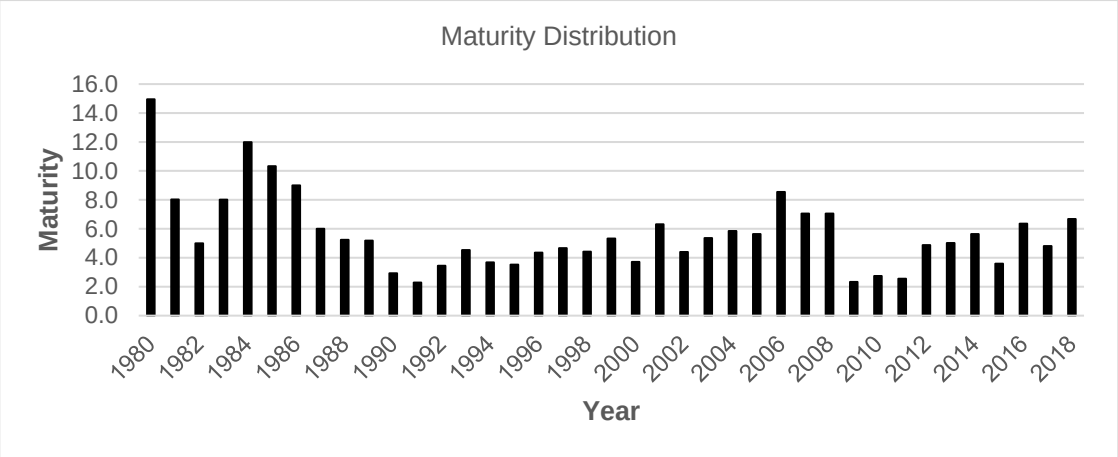

Figure 1: Average annual maturity distribution of sample

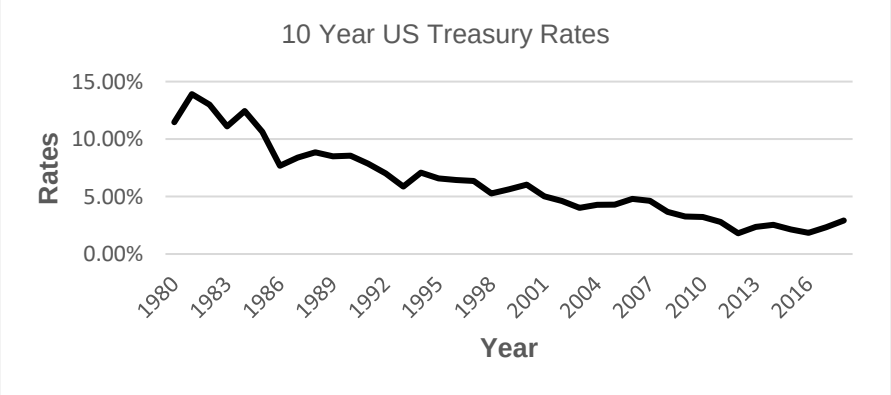

Figure 2: Annual 10 year constant maturity US treasury rates (source: www.federalreserve.gov)

Table 3 depicts the annual breakdown of the data by the number of issues, *Maturity*, *Ratings,* and issues with *Call*. A majority of these issues (81.6%) are issued in the time period 1992 to 2007, the period of higher

interest rates with the expectations of falling rates. The average annual maturity of the sample over the entire time period is around the average of five years. This observation is consistent with Diamond (1991) that low risk firms with growth options prefer shorter maturity debt. Tewari et al. (2015) classify bonds as shorter maturity bonds for the issues with maturity less than or equal to 20 years and, as longer maturity bonds for the issues with maturity greater than 20 years. Our sample suggests that the Floating rate bonds are typically issued with shorter maturity. The maturity distribution (Figure 1) depicts a dichotomous annual distribution. We observe that the average annual maturity of the bonds was much higher in the early to mid 1980s while the average annual maturity decreases to 5.1 years from 1992 to 2007. This is possibly due to the fact that the rates were very high in the early 1980s and declined rapidly followed by steady rates from 1992 to 2007 and the subsequent drop due to the financial crisis (Figure 2). Firms engineer bond provisions to manage their interest rate risk.

The proportion of issues with *Call* is only (217/2,027 = 10.7%). These observations also confirm our first hypothesis that the floating rate provision is a substitute for the call provision when the rates are high and are expected to fall.

Table 3: Sample breakdown by year

Year	Number of Issues	Average Maturity (Years)	Average Ratings	Number of Issues with Call
1980	1	15.0	11.5	1
1981	1	8.0	14.0	0
1982	5	5.0	13.8	2
1983	7	8.0	14.1	1
1984	19	12.0	12.0	14
1985	23	10.3	11.3	20
1986	3	9.0	11.0	2
1987	3	6.0	13.3	2
1988	9	5.2	12.7	4
1989	9	5.2	11.0	4
1990	13	2.9	12.8	4
1991	10	2.3	11.5	0
1992	34	3.4	11.9	0
1993	55	4.5	11.2	5
1994	118	3.7	11.0	13
1995	83	3.5	11.1	6
1996	128	4.4	11.6	11
1997	149	4.7	11.7	3
1998	168	4.4	11.6	10
1999	123	5.3	12.3	6
2000	195	3.7	11.7	10
2001	129	6.3	12.4	7
2002	97	4.4	12.1	5
2003	100	5.4	11.9	7
2004	119	5.8	11.5	13
2005	61	5.6	11.5	6
2006	55	8.5	11.3	13
2007	40	7.1	11.2	5
2008	16	7.1	12.4	3
2009	3	2.3	11.7	0
2010	12	2.7	13.4	0
2011	21	2.6	11.0	1
2012	10	4.9	9.6	1
2013	42	5.0	11.9	4
2014	29	5.6	11.2	1
2015	25	3.6	12.5	4
2016	37	6.4	12.1	14

2017	48	4.8	10.8	10
2018	27	6.7	9.7	5
Total/Average	2,027	5.0	11.7	217

Firm Specific Variable: *Total Assets* variable captures the size of the firm and is used as a control variable. *M/B*[*] variable is commonly used as a measure of presence of growth options in the firm. The *Leverage* variable (Total Debt/Total Assets) is used as a measure of the level of debt of the firm. Finally, the *FCF* variable is used as a proxy of managerial entrenchment (Jensen, 1986). The approach used by Lehn and Poulson (1989); Bae, Klein and Padmaraj (1994)[†] is used in calculating the *FCF*.

Descriptive Statistics: Table 4 contains the descriptive statistics of the variables used in the regression analysis. We gather a few important observations from the table. *Treasury* has a mean value of 4.52% and a wide range of 13.46% maximum value to a minimum of 0.16%. Roughly half the issues have the *Split* rating which is in line with Tewari et al. (2015). Very few issues have *Call* and *Othcov* restrictions.

Table 4: Descriptive statistics of sample variables

Statistics	Treasury	Principal ($mil)	Maturity (Years)	Ratings	Call	Othcov	Split	Total Assets ($mil)	M/B	Leverage	FCF ($mil)
Mean/ Number	4.52%	219	5.1	11.7	217	209	894	8,8195	7.8	264.3	6,614
Median	5.04%	100	3.0	12.0	0	0	0	65,171	5.2	188.6	5,214
Maximum	13.46%	4,000	40.1	16.0	1	1	1	677,447	426.9	2606.3	43,357
Minimum	0.16%	1.0	1.5	7.0	0	0	0	39	1.2	6.7	3.6
Std. Dev.	2.15%	355	7.6	1.7	N/A	N/A	N/A	92,199	11.7	321.1	7,007

Empirical Analysis

The regression equation to test the second hypotheses is as follows:

$$CAR_i = Constant + \beta_1\, Treasury_i + \beta_2\, (\frac{Principal}{Total\ Assets})_i + \beta_3\, Maturity_i + \beta_4\, Ratings_i + \beta_5\, Call_i + \beta_6\, Othcov_{\,i} + \beta_7\, Split_i + \beta_8 \log (Total\ Assets)_{\,i} + \beta_9\, (M/B)_i + \beta_{10}\, Leverage_i + \beta_{11}\, FCF_i + \varepsilon_i \quad (5)$$

Table 5 depicts the results of the regression analysis with the above listed variables. Coefficient for *Treasury* variable is positive and significant at the 1% level providing strong evidence that the floating rate bonds are beneficial to the firm when issued in the high interest rate environment reinforcing our hypothesis. Coefficient of the *Principal* and *Total Assets* is negative and significant at the 5% level providing evidence that the small firms raising smaller amount of capital through the floating rate bonds benefit more, likely due to the floor on the coupon rate when it resets. Coefficient for *Maturity* is insignificant since the floating rate bonds are generally issued with short maturity. Coefficient for *Ratings* is negative at 10% level signifying within investment grade category, firms with lower rated issues stand to benefit more from the issue of these bonds. Coefficient for *Split* is negative at 5% level. This signifies that the firms with higher level of information asymmetry benefits less from issuing these securities since most of these bonds (90.13%) are issued at par therefore, the price is not likely to carry information content that mitigates information asymmetry between the firms and the investors.

Coefficient for *M/B* is positive and highly significant at 1%. This provides strong evidence that high growth option firms stand to benefit significantly from the issuance of floating rate bonds. This observation confirms our second hypothesis that the firms in possession of growth options exhibit positive and significant CAR since, the floating rate bonds provide greater financial flexibility in addressing interest rate risk for the firms as compared to a more restrictive call option.

[*] M/B = (Market value of Equity+ Book Value of Assets – Book Value of Equity)/Book Value of Assets.
[†] FCF = (Operating cash flow – Tax – Int Exp – Cash dividend)/Net Sales

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Coefficient for *Leverage* is positive and significant at 1% which suggests that issuing floating rate bonds provides greater financial flexibility to the firms especially, when the rates are high and expected to fall.

Coefficient for *FCF* is insignificant signifying that the issuing these bonds has less potential managerial entrenchment implications.

Table 5: Results of the regression analysis

Variable	Coefficient	t-Statistic
Constant	0.022	1.34
Treasury	0.107***	3.41
Principal/Total Assets	-0.144**	1.94
Maturity	-0.044	0.13
Ratings	-0.019*	1.74
Call	0.006	0.66
Othcov	0.003	0.52
Split	-0.007**	2.33
LOG(Total Assets)	-0.002**	2.12
M/B	0.046***	3.06
Leverage	0.261***	2.71
FCF	-0.032	0.46
Year Dummy	Yes	
Adjusted R-squared	0.188	
N	2,027	

***,** and * significance at 1%, 5% and 10% level respectively

Conclusion

We analyze 2,027 non-convertible, investment grade floating rate bonds (notes) issued between 1980 and 2018. The motive for the study is to understand the possible role the floating rate provision plays in these bonds, and highlight firm characteristics firm possess that benefit the most from issuing these bonds. We find that majority (89.3%) of these issues are non-callable and a majority (81.6%) of them are issued during the high rate environment (1992 to 2007) where the rates are expected to fall in the future. We find that the floating rate provision is an effective alternative to the call option in mitigating the firm's interest rate risk. Especially, since the call option can be restrictive and costly in terms of call protection period and call premium. In the case of floating rate bonds, the coupon resets to a lower rate periodically when the rates are falling unlike the call option which can make refinancing restrictive and costly. The market realizes this and rewards the issuing firm with a higher CAR in the event window surrounding the issue date.

Using CAR as the dependent variable we further assess firm characteristics that are likely to benefit more from issuing these bonds. We find that the firms with growth options and with high leverage achieve a positive and significant CAR. This observation is likely due to the financial flexibility these firms achieve in, realizing growth options, through the issuance of these shorter maturity bonds as compared to the bonds with more restrictive covenants. Also, we find that firms with higher level of information asymmetry benefits less from issuing these securities.

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