DETERMINANTS OF CREDIT SPREAD & ANNUAL COUPON RATE

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Abstract : This paper presents the determinants of credit spread and the coupon rate of the bond in the Indian debt market. The focus of the paper is on the factors influencing the spread in the debt market, which are the credit risk and the market risk factors. The research findings show that the credit spread is highly influenced by both credit risk factors like the default rate of the bond and the stability of the rating, and the market risk factors like inflation, liquidity in the market, the risk free rate of the economy and the exchange rate. In this paper we determine a significant linear dependency relationship of credit spread and the coupon rate on the credit and market risk factors with the help of regression analysis.

Keywords: Credit Spread, Coupon rate, Default rate, Liquidity Assessment Facility (LAF), Credit and Market risk.

OBJECTIVE

The purpose of this article is to examine and explain the differences in rates offered on corporate bonds and those offered on government bonds (spreads), and in particular, to examine which are the important factors which influence the Credit Spread.

The credit spread in the corporate debt market is one of the important sections of research. The research performed in this section is very specific to the factor.

LITERATURE REVIEW

The Merton framework states that the risk free rate has an impact upon the value of the corporate bond. The overall effect of an increase in the risk free rate is to decrease the effective costs of insurance against default on the firm's debt. So, as the risk free rate increases the credit spread should tighten.

According to Davies research on credit spread determinants, higher risk firms are particularly vulnerable to the economic environment within a deflationary environment. High grade bonds are alternatively the subject of a very low level of default risk. The primary concern for investors in high grade debt is the risk of inflation, since bonds generally perform poorly under inflationary conditions. According to Chikashi Tsuji the credit rating would explain spreads, but only to a limited degree; it would also partially or completely dominate the explanatory power of illiquidity and credit-related factors due to its synthetic characteristic.

A surprising finding from this literature is that the possibility of default explains a small proportion of the spread (i.e. approx. 32% of spread) which goes along with Georges Dionne's (2006) findings. For example, using structural bond pricing models calibrated to historical default and recovery, Huang and Huang (2003) found that only 20% of the Baa-treasury spread was explained by the possibility of default. Ericsson and Reneby (2004) and Bruche (2005) investigated if maximum likelihood estimation method applied to structural bond pricing model can produce better empirical results.

According to Astrid Van Landschoot (2004), the structural models and empirical evidence on credit spreads show that changes in the level and the slope of the default-free term structure, the

market return, implied volatility, and liquidity risk significantly influence credit spread changes. In this paper we establish a relationship between credit spread and the independent factors which are liquidity risk, credit risk and market risk factors.

The other part of the study has been done on the links between default and the business cycle. Chen, Collin-Dufresne, and Goldstein (2005) have verified if the level and the dynamic variations of credit spreads can be explained by a pricing kernel solving the equity premium puzzle. They found that large variations in time-varying risk premiums are essentials for explaining the spreads.

According to Junbo Wang (2006), empirical evidence indicates that municipal bond yields are strongly affected by liquidity risk, default and taxes. The effects of default and liquidity risk on municipal yields increase with maturity and credit risk. Here in our second model we explain the variation in the yield caused due to liquidity adjustment facility, default rate, inflation, and risk free rate.

First of all, there is no unequivocal definition of liquidity across different models and empirical studies. As a consequence different authors use different measures or proxies of liquidity. Secondly, there are competing models which yield different implications regarding the price impact of liquidity on fixed income instruments. Here in this paper we have taken the liquidity adjustment facility (LAF) i.e. repo and reverse repo auctions, which are used by the banks for their day-to-day mismatches in liquidity.

Elton, EJ, states that spreads in rates between corporate and government bonds differ across rating classes and should be positive for each rating class for following reasons:
1. Expected default loss – some corporate bonds may default; so investors require higher promised payment to compensate for the expected loss from defaults
2. Tax premium – interest payments on corporate bonds are taxed at the state level whereas interest payments on government bonds are not.
3. Risk Premium – The return on corporate bonds is riskier than the return on government bonds, and the investor would require a premium for the higher risk taken.

While in this paper, we discuss, only the expected default and the risk premium part of the spread.

A Cointegration Approach states that corporate rates are integrated with government rates and the relation between credit spreads and Treasury rates depends on the time horizon. In the short-run, an increase in Treasury rates causes credit spreads to narrow. This effect is reversed over the long-run and higher rates cause spreads to widen. The research by Ronald Bewley (The impact of stock market volatility on corporate bond credit spreads) states that implied stock market volatility derived from options prices, has no significant impact on these spreads on a day-to-day basis.

In this paper, we focus directly on the bond spreads and their interrelation with other factors. We employ a large dataset of PSU securities, Institutional bonds, Bank securities, and corporate securities, recorded over the period 2002 – 07. In this approach, with help of the cross sectional data we regress the selected factors with the spread. This paper gives a view about the major influential factors for the spread, how spread is dependent on the credit risk factors and the market risk factors. This research paper discusses and reveals the important aspects of the debt market in India.

Here in this paper, we discuss the effect on the credit spread of the corporate Indian markets. First we discuss the methodology and the theoretical aspects of the paper. Later, we discuss results of the model specified along with its implications.

METHODOLOGY

For the testing methodology, we use simple regression analysis, and judge the explanatory power of each variable and overall explanatory power by the significance of each coefficient and the adjusted R-squared, respectively.

In a multiple linear regression model, the hypothesis of overall regression is the hypothesis that the explanatory variables, as a whole, provide some useful information about the response variable. Thus, we accept the hypothesis of overall regression, if we can reject the null hypothesis that none of the explanatory variables influence the response, that is

against the alternative hypothesis for at least one

If Ho is false, that is, if the response variable depends on at least one of the explanatory variables, then the model

should explain a substantial amount of the variation in the data, relative to the residual variation. Thus, if Ho is false, the model variation (Syy – RSSk) should be large relative to the residual variation RSSk. We reject Ho, if the value of the ratio

is large. The -statistic in the ANOVA table is exactly this ratio. It can be shown that if Ho is true then above ratio has an F (k, n-k-1) distribution. We use cross-sectional regression to first test the explanatory power of only those variables that are implied by the theoretical models and the application, and then test the explanatory power of other variables by adding them as explanatory variables to the initial cross-sectional regression model.
The regression model for Credit Spread considers the default rate and the stability as the credit risk factors, LAF for liquidity and others as market risk factors.

Model 1

Credit Spread (CS)
CS = β0+ β1(Default rate) + β2(Stability) + β3(%Δ LAF) + β4(%Δ forex) + β5(Inflation) + β6(Tenure) + ε;
Credit Spread is the dependent variable and the independent variables are default rate, Stability, LAF, Forex and Inflation.

Model 2

Annual Coupon Rate (ACR)
ACR = β0+ β1(Default rate) + β2(Stability) + β3(%Δ LAF) + β4((%Δ forex) + β5(Inflation) + β6(Tenure) + β7(Gsec) +ε;

According to Elton, EJ, the major factors influencing the spread of corporate bond are expected default loss (Credit risk), risk premium (Market risk) and tax premium. In this study we focus on the two factors: credit risk and market risk.

Independent variables: Credit Risk

Default Rate. Ratings affect a bond's yield, or the percentage return investors can expect on the bond. A highly rated bond typically has a lower yield. That's because the issuer does not have to offer as high a coupon rate to attract investors. A lower rated bond typically has a higher yield. That's because investors need extra incentive to compensate for the higher risk. Generally, credit rating is the opinion of rating agencies on the degree of certainty of debt servicing of

corporations, which takes account of both the default probability and the recovery rate. However, this rating does not change in response to changes in the macro-economic conditions. Therefore, it is suggested that the credit rating would explain spreads, but only to a limited degree1.

The default rate for a particular rating for any given period is the number of defaults among the credits carrying that rating, as percentage of the total number of outstanding credits carrying that rating. Normally the Default rate rises as the rating changes from AAA to the lower category. The higher the probability of default higher is the risk in the bond which leads to increase in the spread. So theoretically we can say that; Default rate and Credit spread are positively related, default rate being one of the most important factors in determining Credit spread of the bond.

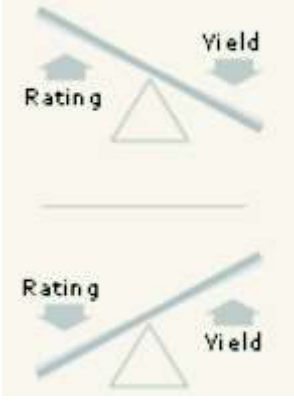


Fig. 1.1
Rating vs. Yield
(Source: Fidelity)

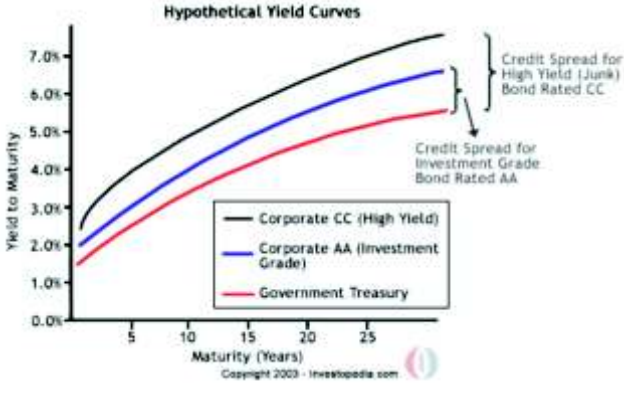


Fig. 1.2 Hypothetical Yield Curves
(Source: Invaestopedia)

From the above figure we get to know how the yield curves move with the maturity. This is how the yield curves are supposed to move as the lowest one should be the government treasury, above it should be the bonds depending upon the credit spread.

Stability. Transition rates indicate the probability of a given rating category over a period of time. The stability rates are extracted from the transition matrix of CRISIL rating default study 2007. The diagonal of the matrix displays the stability rates for each rating. The probability to the left of the diagonal represents the upgrades while on the right represents the downgrades.

Stability of the bond may have varying effect on the spread according to the category of the rating. The higher category bond should have negative effect while the investment grade bonds should have positive effect. This phenomenon can be used to determining the different category of bonds in a sample with unknown ratings.

Independent variables: Market Risk

Inflation. Inflation is rise in general level of prices of goods and services over time. Debtors may be helped by inflation due to reduction of the real value of debt burden. So the burden will be shifted to the investors. Low grade bonds are by definition subject to default risk, hence low grade investors will be primarily concerned with the risk of default. Deflationary episodes pose particular problems for low grade firms since there is a lack of pricing power in the broader macro economy. Hence, higher risk firms are particularly vulnerable to the economic environment within a deflationary environment. High grade bonds are alternatively the subject of a very low level of default risk. The primary concern for investors in high grade debt is the risk of inflation, since bonds generally perform poorly under inflationary conditions2.

When there is inflation, there is rising risk in the economy, so the credit spread has to widen to compensate the investors for the risk.

Liquidity (LAF). The introduction of the Liquidity Adjustment Facility (LAF) was announced in the slack season credit policy by the RBI governor and was made effective on the 5th of June 2000. The system is being implemented in phases and currently is a daily exercise in which Banks and Primary Dealers (PD) participate. The ultimate objective of the LAF is to adjust short-term liquidity situation to the overall policy stance.

Under the scheme,

(i) Repo auctions (for absorption of liquidity) and

(ii) Reverse Repo auctions (for injection of liquidity)

will be conducted on a daily basis (except Saturdays). The funds under LAF are expected to be used by the banks for their day-to-day mismatches in liquidity.

Here we have taken the change in LAF with respect to the change in the Narrow money (M1) in the economy. It is a category of money supply that includes all physical money like coins and currency along with demand deposits and other liquid assets held by the central bank.

If the credit spread in the market is high at that point of time, large amount of money would be borrowed from the market and less would be borrowed by central bank. Hence there will be a direct relation with the amount injected in the system and inverse relation with the outstanding amount which is the proxy taken for analysis.

In the analysis we have taken the outstanding amount with RBI w.r.t. Narrow money as the proxy. So we have the injected amount as negative and the absorbed liquidity by RBI as positive quantity.

Foreign Exchange Rate (Forex). The foreign exchange rate is an indirect factor which influences the credit spread. There is lot of funds flowing from the foreign countries in form of volatile FIIs. When the rupee is appreciated the foreign investment would be increased and if rupee is depreciated, funds will flow out. This is due to the fact that the appreciation of the rupee denotes the strengthening of the Indian economy so the funds flow in. In the regression analysis we have used percentage change in the dollar value of the rupee (Rs/$).

Risk free rate. In the Merton framework the risk free rate has an impact upon the value of the corporate bond for two reasons. First, an increase in the risk free rate implies that the price of the put option will decrease because the discounted present value of expected future cash flows will have decreased. The corporate bond investors experience a net increase in the value of their long corporate bond position. The price of the corporate bond increases and the spread over an equivalent risk-less bond tightens.

The second effect arises from the structural assumption that the firms' risk-neutral growth path is a positive function of the risk free rate. As the risk free rate increases firm value increases, again lowering the price of a put option on the firm. The overall effect of an increase in the risk free rate

is to decrease the effective costs of insurance against default on the firm's debt. The price of a put option to protect against that default has fallen as the risk free rate has increased. Increases in the risk free rate reduce the price of the put option, implying that the corporate bond will increase in value, the corporate yield will fall and the spread over an equivalent risk free bond will tighten. Here we take the interest rate on central government securities, which is the weighted average of the central government securities with different maturities. Better results are expected by taking the corresponding value of the interest rate for different maturities and issuance time. But the result would be almost the same.

Tenure. Normally as the tenure of the bond increases, the risk also increases hence the credit spread should also increase. Research states that corporate rates are cointegrated with government rates and the relation between credit spreads and Treasury rates depends on the time horizon. In the short-run, an increase in Treasury rates causes credit spreads to narrow. This effect is reversed over the long-run and higher rates cause spreads to widen3.

DATA

The annual coupon rate was calculated from the above database. The frequency was known and we got the annual coupon rate for each bond individually, and so the coupon rate was calculated accordingly.

EACR = Effective annual coupon rate;
m = coupon frequency;
r = coupon rate;
$EACR = (1 + r/m)^m$

The interest rate on central government securities was collected from Reserve Bank of India records. It is the weighted average of the central government securities with different maturities. It would have been advantageous if daily data of Central government securities would have been used for better results. It is being used as the risk free rate in the research. The Credit spread for different bonds was calculated by subtracting the EACR from the corresponding central government security yield. The inflation data has been calculated from the wholesale price index (WPI) available from 'The Office of Economic Adviser' with a weekly frequency. The foreign exchange data of India was collected from Board of Governors of the Federal Reserve System with a monthly frequency.

Withdrawal adjusted cumulative default rate has been used which is obtained from the CRISIL database. It is one of the most important factors of the research as it takes into account the credit risk part of the model along with stability. The stability data has been extracted from the CRISIL rating default study 2007. It is taken from the average one year transition rate 1992-2007.

The LAF data is available on the RBI database with a daily frequency. It is the proxy used for the liquidity in the market. We have taken the outstanding amount from the market, which implies that the injected amount is taken as negative amount and the absorbed amount as positive.

In the following table we have the details of the dataset; the first table segregates according to the maturity of the bonds while the second table according to the rating structure.

Number of bonds taken into account according to rating & maturity

Maturity	Number
< 3	14
3 to 5	37
5 to 10	371
>10	441

Ratings	Number
AAA	300
AA	92
A	51
Others	420

ANALYSIS

Firstly we check the Pearson correlation matrix before going to regression analysis to have an idea about the correlation between the variables. In the matrix, the default rates and stability are highly correlated with credit spread and the coupon rate. The two variables are correlated with each other. So from this we can conclsude that there is certain influence of these variables on the dependent variables. On the other hand the significant correlation within the variables shows the dependence of the variables on each other.

Table 1.1
Pearson Correlation Matrix

	Spread	Coupon	Gsec	Default	Tenure	Stability	Forex	LAF	Inflation
Spread	1.0								
Coupon	0.8*	1.0							
Gsec	0.1	0.7*	1.0						
Default	0.7*	0.5*	0.0	1.0					
Tenure	0.0	0.0	0.0	0.1	1.0				
Stability	-0.6*	-0.4*	0.0	-0.9*	-0.1	1.0			
Forex	0.1*	0.2*	0.2*	0.3*	0.1*	-0.3*	1.0		
LAF	-0.2*	-0.4*	-0.4*	0.0	0.0	-0.1	0.2*	1.0	
Inflation	0.0	-0.1	-0.2*	-0.2*	-0.1	0.1	-0.5*	0.0	1.0

(* significant<0.001)
Model I (Credit Spread)

Table 1.2
Anova. (Analysis of variance) for CS

Number of observations	859
F(7, 851)	82.51
Prob > F0	
R-squared	0.52
Root MSE	0.76

The F stat value is high 82.51, and the P value (<.0001) for the overall model shows the significance level of the model. Thus, we accept i.e. (do not reject the hypothesis) the hypothesis of overall regression, if we can reject the null hypothesis that none of the explanatory variables influence the response. While the model explains the 52% of the variation in the variable credit spread, the R square counts to be 0.5213. R2 is a statistic that will give some information about the goodness of fit of a model. In regression, the R2 coefficient of determination is a statistical measure of how well the regression line approximates the real data points.

Table 1.3
Parameter estimates

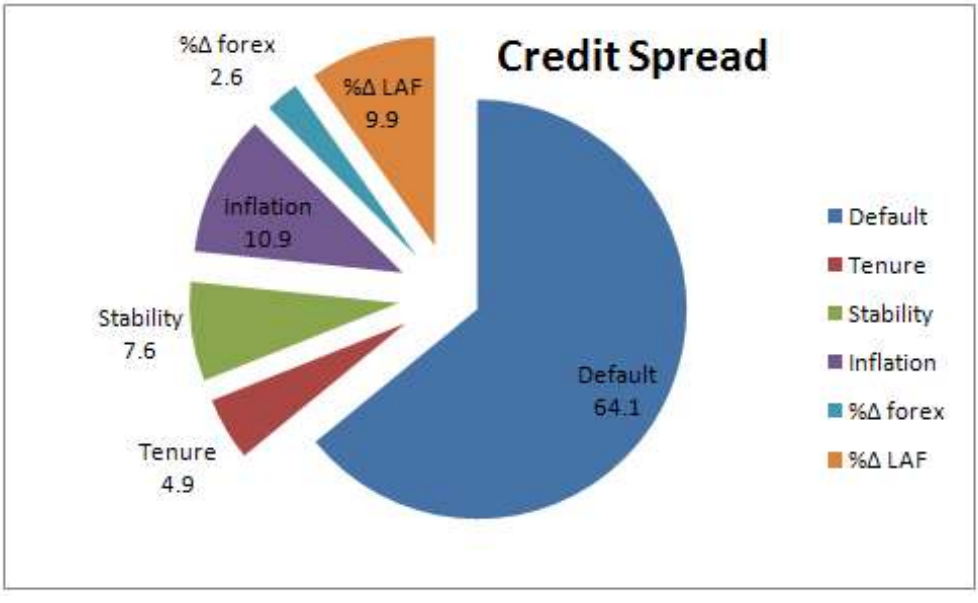
Variable DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate		Variance
Inflation							
Default 1	8.94	0.76	11.63	0	0.81	5.21	
Tenure 1	-0.02	0.006	-2.92	0.00	-0.06	1.03	
Stability 1	0.02	0.01	1.61	0.10	0.09	5.17	
Inflation 1	11.28	2.10	5.37	0	0.13	1.12	
%? forex	1	-6.16	2.73	-2.26	0.02	-0.03	1.04
%? LAF 1	-0.0001	2.17 x 10-5	-4.89	0	-0.12	1.2	

In regression with multiple independent variables, the coefficient tells you how much the dependent variable is expected to increase when that independent variable increases by one, holding all the other independent variables constant. Here we have all the variables significant with P value less than 0.05.Except the few variables LAF, change in forex & tenure, all the other variables are having positive effect on the credit spread. The variables being highly correlated with each other, there may be a problem of multi-collinearity. So with help of the variance inflation factor (VIF) we check for the multi-collinear problem. The VIF should be less than 5, and between 5-10 is acceptable. So from the above table we can infer the model is free from multi-collinear problem. As we cannot compare the parameter estimates directly, we need to standardize it. The standardized estimate would give a better understanding about the comparative study of the variables.

Table 1.4 Standardized estimate

Variable	Influence on CS	Standardized	
		Estimate	% contribution
Default	+	0.76	64.1
Tenure	-	0.006	4.9
Stability	+	0.013	7.6
Inflation	+	2.10	10.9
%Δ forex	-	2.73	2.6
%Δ LAF	-	2.17×10^{-5}	9.9

Fig. 1.3 Influence of the factors on Credit Spread (CS)



From the above figure we get to know the major influencing variables are the default rate, stability of the rating, LAF and inflation. But more than 30% (60% of the model and R square is 0.52) of the variation of the credit spread is explained by the default rate of the bond, while the stability of the rating explains 3.6% of the variation. So we can state that credit risk is the major influencing factor on Indian bond market, which is around 35.65%.

So we get a relationship as follows :

CS (Credit Spread) = -2.26+ 8.94 (Default rate) + 0.02 (Stability) -0.0001 (%? LAF) -6.16 (%? forex) + 11.28 (Inflation) -0.02 (Tenure)

Model II (Annual Coupon Rate)

Table 1.5

Anova for ACR

Number of observation	859
F(7, 851)	610.37
Prob > F	0
R-squared	0.7608
Root MSE	0.76336

From the anova table we get that 76% of the variation is explained by the model. The unexplained part of the variance is due to the more specific factors related to the firm, which vary from industry to industry and sector to sector and which are difficult to track down. The P value which is less than 0.001, states the significance of the model.

Table 1.6
Parameter estimate for ACR

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate	Variance Inflation
Gsec	1	1.07	0.02	49.25	0	0.70	1.26
Default	1	8.94	0.76	11.63	0	0.57	5.21
Tenure	1	-0.02	0.00	-2.92	0.00	-0.04	1.03
Stability	1	0.02	0.01	1.61	0.10	0.06	5.17
Inflation	1	11.28	2.10	5.37	0	0.1	1.12
%Δ forex	1	-6.16	2.73	-2.26	0.02	-0.02	1.04
%Δ LAF	1	-0.0001	2.17×10^{-5}	-4.89	0	-0.09	1.12
Intercept	1	-2.26	1.35	-1.67	0.09		

From the above figure we get to know the major influencing variables are the default rate, stability of the rating, LAF and inflation. But more than 30% (60% of the model and R square is 0.52) of the variation of the credit spread is explained by the default rate of the bond, while the stability of the rating explains 3.6% of the variation. So we can state that credit risk is the major influencing factor on Indian bond market, which is around 35.65%.

So we get a relationship as follows :

CS (Credit Spread) = -2.26+ 8.94 (Default rate) + 0.02 (Stability) -0.0001 (%? LAF) -6.16 (%? forex) + 11.28 (Inflation) -0.02 (Tenure)

Model II (Annual Coupon Rate)

Table 1.5

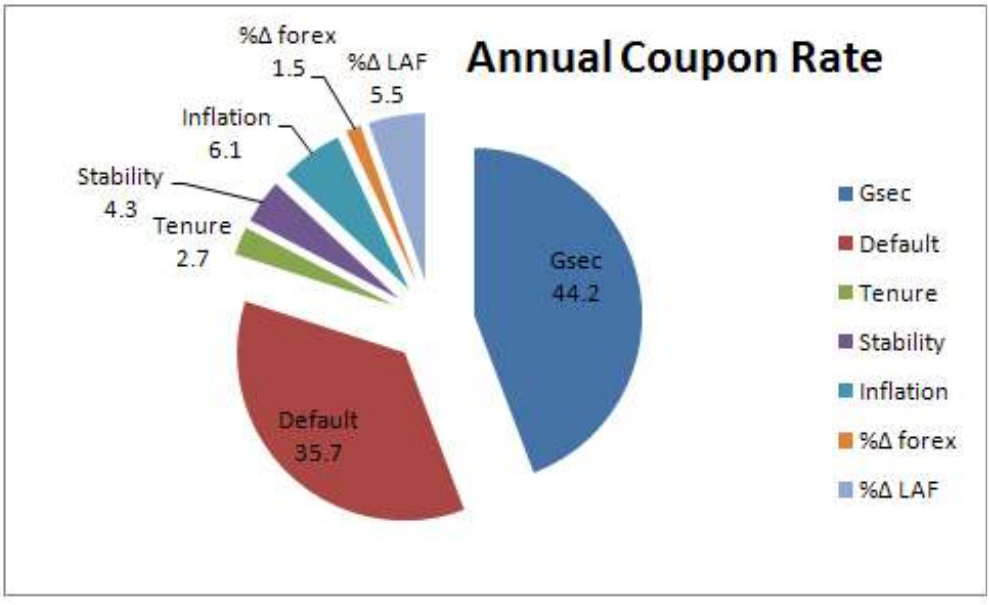
Anova for ACR

Table 1.7
Standardized estimate

Variable	Influence on ACR	Standardized	
		Estimate	% contribution
Gsec	+	0.70	44.2
Default	+	0.57	35.7
Tenure	-	0.04	2.7
Stability	+	0.06	4.3
Inflation	+	0.1	6.1
%? forex	-	0.02	1.5
%? LAF	-	0.09	5.5

The contribution of each factor is clearly visible in the following pie chart of effect on ACR.

Fig 1.4 Influence of the factors on Annual Coupon Rate (ACR)



So we get a relationship as follows:

ACR (Annual Coupon Rate) = -2.26+1.07(Gsec) + 8.94(Default rate) +0.021(Stability) -0.0001(%Δ LAF) -6.16 (%Δ forex) + 11.28(Inflation) - 0.02(Tenure)

DISCUSSION

As said by Merton that the risk free rate should have significant effect, the research explains 34% of the variation of the coupon rate. The research explains the possibility of default having a nominal effect on the credit spread. In this paper we establish a relationship between credit spread and the independent factors which are liquidity risk, credit risk and market risk factors. As we have seen, the debt market in India is not just influenced by the credit rating of the bond; there are several other factors which come along the line. After considering inflation, liquidity risk and default probability, only half of the model is explained. So there are certain hidden factors in the economy, which affect the debt market. The debt market is too sector and firm specific, as the market is immature in nature. Here we haven't considered the tax effect which may cause the variation too, as most of the bonds in Indian market are not traded till date of maturity comes to play. In a developing country like India, one of the important parts is the inflation. Developed countries check for stability in the economy while developing countries go for rising growth rate. So inflation is blessing in disguise for developing countries. So as the model explains the positive deviation in the spread, the rising risk should be offset by the higher spread as stated by Davies. The unstable nature of the economy raises concerns about the factors such as stability of the rating, inflation, risk free rate, foreign exchange risk and above all the default rate.

Implications

The research gives an insight about the nature of the debt market in Indian context. It specifically tracks the variation of the credit spread and yield of the fixed income securities with the help of statistical analysis. One can know how simple statistics can be utilized to get significant and useful results for further applications. The research is basic foundation for further researchers. It will help to understand the influence of the basic market factors and its implications.

This research would help to make decisions regarding which factors are to be considered and with what weightage. The research would be widely helpful for credit rating firms. This research may help to analyze the variation of spread and its variation due to other factors. The research may help in investment process also, by determining the various risk of the debt and analyzing it as per the requirement.

Limitations and Weakness

In this research we have not considered the effect of the tax on the credit spread; as stated by Elton it is one of the important aspects to be considered. The tax on the other hand may also have a significant contribution, considering the nature of the tax structure in India. The other aspect to highlight here is that the consideration of equity return may have an effect on the debt market which is certain in nature. One can use risk free rate of the same maturity, as in this research weighted average has been taken due to unavailability of data.
One can also use more complex statistical tools to analyze as regression is the simplest and basic foundation laying method. Regression analysis only provides the results on the basis of historical database, so these results may or may not be applicable in future.

Suggestions for researcher

This research has been done in a broader sense, taking the debt market into consideration. Research can further be specialized considering segregation into different rating buckets. Further research can be enhanced with the help of complex time series analysis for sector specific and rating specific analysis. The credit spread as stated by Merton may be influenced by firm value; so during sector specific analysis one can add firm value, asset volatility into the model to explain the variation in the spread. These are firm specific variables but will give much better and focused results. One can also add the slope of the term structure in the independent variables, as the expectations hypothesis of the term structure implies that the slope of the default free term structure, which is often measured as the spread between the long-term and the short-term rate, is an optimal predictor of future changes in short-term rates over the life of the long-term bond.

CONCLUSION

The market risk and credit risk are the important factors which affect the spread and coupon rate. As we have seen, the default rate and the stability of the bond which are the credit risk factors have a major influence in determination of the spread and coupon rate. While on the other hand if we look at the market risk factors, risk free rate, foreign exchange rate in terms of dollar, inflation and LAF are considered in this model.

The risk free rate (central government securities rate) of the economy is having a significant contribution in determination of the annual coupon rate. If we look at the relation with the maturity of the bonds, it is having a negative impact on the spread. But theoretically it should be other way round, having a positive effect.

Liquidity is an important factor to be considered. Investors are aware of difficulties caused by this illiquidity, particularly in selling bonds, and hence, illiquidity should be compensated for by the liquidity risk premium in the spread. There are various ways in which we can introduce the liquidity factor. Sarig and Warga state that volume traded should be used as the proxy for liquidity. But as the Indian markets are illiquid in nature, we hardly get any amount of transaction. Most of the transaction end at the maturity without any transactions taking place before maturity.

To test this liquidity, the amount of bonds issued by each corporation can also be used as a variable, LIQ. This issue amount is a record of the launching performance of each firm in the corporate bond market, and hence, indicates the status of each firm in the market. Thus, LIQ is considered to be strongly related to the liquidity concept of Lippman and McCall (1986), namely the time to optimal trade or transaction immediacy, and is therefore expected to be negatively related to the credit spread.

Here we have taken the rate of change in LAF with respect to Narrow money, which takes into account the daily liquidity in the market. As we have negative relationship with LAF which is the outstanding amount with RBI, it has negative impact on the spread, which means that the injected liquidity in the economy is having a positive effect on the spread and the absorption by RBI has negative effect.

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