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Abstract

Bond markets in emerging markets are illiquid as investors and issuers grapple with major microstructure and legal issues. The importance of bond markets as a source of finance has increased during the economic slowdown as companies diversified away from reliance on banks for funding and many governments increased borrowing to fund the economic slowdown in their countries. Indian corporate bonds market is very illiquid vis-à-vis the Government securities market and heavily rely on AAA rated bonds for both issuance and trading. The data dissemination provided in public domain is inadequate to effectively price bonds taking all risks into account. Bank bonds demand hefty premia from investors and they are considered almost risk free with low credit spread. Investors use Credit rating information to price bonds in the market. Indian corporate sector is fast moving to international markets to raise funds through ECB / FCCB route though FCCB funding has dried up due to bad equity market conditions. Issuance market has remained concentrated with few issuers dominating the market. Financial companies like Non-Banking Finance companies dominate the market with issuances. The study did not find any significant relationship of coupon with optionality of the bond but it found that the Rating has significant relationship with coupon. Lower maturity bonds were having comparatively higher coupon than long maturity bonds. This may be possible as the year 2011-12 witnessed unprecedented liquidity scarcity in the Indian market and rolling over a debt was considered costly and investors demanded higher premia to fund short term bonds. While trading, investors demanded a higher premia for taking investment decision on bonds having floating rate. The relation between Rating class and yield was also found to be rational as higher yield were demanded on bonds with lower rating. The probability of default is higher at the shorter end and the same falls at the longer end. The reason may be the uncertainty existing in the short term with respect to liquidity and other macroeconomic factors might be warranting higher probability of default to be factored in yields. The study finds that the market used the past spreads to price the credit spread they would charge on corporate bonds while trading in the market.

Key words: Indian Corporate bond market, corporate bond, emerging market, bond rating, probability of default, credit spread, spot yield curve, credit risk

JEL Classification: C32, C52, C61, G12, G13, G32, G33

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Indian Corporate Bonds Market –An Analytical Prospective

Golaka C Nath

Global bond market stood at US\$95trillion as of 2010 out of which 70% accounted for domestic bonds. The US was the largest market with 38% of the value outstanding, followed by Japan 20%. Government bonds accounted for 57% of the outstanding value of domestic bonds in 2010. Greece's credit rating has been downgraded a number of times. Other countries with high budget deficits such as Portugal, Ireland, Turkey, Italy and Spain have also seen downgrades. Increasing concern about the ability of some governments' to repay their debt, has resulted in a significant widening of government bond yields. Recently, 10-year Spanish Government bonds reached 6% mark which is considered very high. According to Dealogic, book runners' deal volume from global debt capital markets totalled \$6.05 trillion in 2010, down 2% from the previous year but nearly 40% up on the volume two years earlier. In relation to the size of the economy, in Europe, public sector debt is highest in Greece (134% of GDP), Italy (119%), Portugal (91%) and Ireland (87%). Net government debt is set to increase in the next few years due to the high level of projected government borrowing in many countries. The US corporate bond markets have long been an important source of capital for issuers, with daily trading volume of \$16bn and more than 400 mutual funds investing in US high-yield bonds.

Discussion on Indian corporate bond market has been going on for ages and in each and every forum, the need for developing the corporate bond market as an alternative funding arrangement is well understood and acknowledged. Both Government and Securities Exchange Board of India (SEBI) have set up many Groups, Committees, and Forums to study and discuss the issue for finding out a workable solution. The Dr. R H Patil Committee report (2005) presented a reasonable solution and roadmap for kick-starting this form of the market to fulfill the future need of the Industry in funding investment. Almost 7 years have passed after the report was made public, not much headway has been achieved. Some of the issues like unification of stamp duties on creating charges for securitized debt have been contentious issues and no solution has been found to take this market to the place where it belongs. Unlike other countries, a large chunk of corporate funding in India is done through banking, retained earnings and capital through equity offerings. Corporate bonds contribute fairly little in terms of long

term funding. Most of the studies on Indian bond market centered on issues pertaining to the market microstructure issues and other bottlenecks in the market specifically cost related ones.

Recently, Government introduced specialized regimes for a corporate bond market in the infra sector. Government allowed tax benefits (Budget, 2010) on infra investment upto a limit for tax payers. Key motivation for investing in debt market is tax saving for tax payers.

The paper tries to understand the basic structure of Indian corporate Bond market, legal and regulatory issues delaying the development of the corporate bond market in India, its issuance and trading behavior, pricing of risk, structure of probability of default of the corporate bonds, the behavior of credit spread. The paper is divided into few sections: Section 1 gives the brief background to develop corporate bond market in Emerging market like India; Section 2 gives Regulatory and Operational Framework of Indian Corporate Debt Market; Section 3 discusses about Market Participants from both Supply side and demand Side and challenges they face; Section 4 discusses about some of the challenging issues with respect to data and market structure; Section 5 discusses about current market dynamics; Section 6 discusses the structure of probability of default in corporate bonds in India; Section 7 analyses the corporate credit spread for AAA rated securities and Section 8 draws the final conclusion of the study.

1. Corporate Bond Market Need:

In any economy, equity and debt are two useful sources of financing for corporates. It caters to investors having different risk appetites and requirements. When a firm cannot finance its activities solely through equity, it must look at debt financing to support its activities and support development and growth (Allen, Kraakman and Subramaniam, 2009). Equity investors have generally a smaller time frame of investment but debt investors are long term investors in a firm. This debt is funded through bank loans and bond issuances. A liquid bond market helps an economic entity to raise funds at cheaper cost vis-à-vis syndicated loan from banks (Mishkin, 2006). The liquid bond market helps investor to convert their holdings into cash as there are others who would like to take the risk of investing in bonds if the return is appropriate for them to assume such risk. The secondary market trading also provides important information not only on price but also on many other factors like credit risk appetite, spread, default probability, etc. The tradability of bonds issued by an issuer helps the market in getting required information on the firm (Mishkin, 2006). Further, development of Credit Default Swap (CDS) market

globally also helped in unbundling the risk and reselling the same at appropriate rate. In India, CDS market has been introduced but lacks liquidity.

In India, most of the financial markets like equity, equity derivatives, currency derivatives, commodity derivatives, Government bonds, money and currency market including OTC currency derivatives, OTC interest rate derivatives are relatively well developed while corporate bond market is not a well-developed market. This is in contrast to other developed and emerging markets in the world. India's corporate bond market, about 30 percent the size of China's, is failing to expand at the rate analysts say is needed for the government to meet its target of building infrastructure. India has about \$200 billion of corporate bonds outstanding (Bloomberg) compared with China's corporate bond market of \$614 billion, according to Asian Development Bank figures (2011). The corporate bond market has been wary of the large government borrowing program crowding out the market and a new SEBI law on rollover of limits limiting FII participation. SEBI introduced restrictions on rollover of limits if bonds are sold before maturity. FII's who have filled up the corporate bond limits and want to sell the bonds will not be able to buy them back as they have to apply for fresh limits from the regulator. Both SEBI and RBI allowed FIIs to invest in long term unlisted NCDs issued by companies in the infrastructure sector ("Infra Bonds") provided that the Infra Bonds have a minimum residual maturity of five years and are subject to a minimum lock-in period of one/ three years during which the FIIs will be allowed to trade amongst themselves but cannot sell to domestic investors and are subject to certain prescribed limits. The recent tussle on tax issues between FII's and the government is also hurting sentiments on FII investments in bonds. A weakening Rupee does not help either, as a weak currency is a deterrent for investments in debt by FII's. The government has set the cumulative debt investment limit in corporate bonds (including Infra Bonds) for FIIs at US\$45 billion and at US\$15 billion in government securities.

Corporate bonds account for about 2% of GDP (Khanna & Varottil, 2012) and equity market is many notches ahead of corporate bond market in this regard. Total issuances have been far lower than the Government securities issuances in India (Table - 1).

Table – 1: Issuances of Bonds – Corporate Bonds and Government Securities in India								
Month	No. of Issues Private Placement	Amount (Rs.Cr)	Public Issues	Amount (Rs.Cr)	Total Issues	Amount (Rs.Cr)	Government Securities Maturity Upto***	Government Securities** Amount (Rs.Cr)
2007-08	744	118484.6	0	0	744	118484.6	30 years	188205
2008-09	1041	173281.2	1	1500	1042	174781.2	30 years	306550
2009-10	1278	212634.9	3	2500	1281	215134.9	30 years	459497
2010-11	1404	218785.4	10	9451	1414	228236.4	30 years	479482
2011-12	1404*	188530.5*	12*	15045.84*	1416*	203576.3*	30 years	600409

Source: SEBI, CCIL; * indicates data upto Dec 2011, ** indicates Dated securities and 364-day T-bills,

*** indicates large number of issuances were re-issued Government securities

Note: 1 Crore means 10,000,000 (10 million) and in India, April to March is followed as a Financial Year

Secondary market has remained relatively illiquid vis-à-vis the Government securities market. Other markets in India have grown in terms of their trading activities while corporate bonds have remained dormant with lower level of activity (Table – 2).

Table – 2: Trading activity in various Markets in India								
Month	Corp Bond Trades	Corp Bond Value (Rs.Cr)	Gilts Trades	Gilts Amount (Rs.Cr)	Forex Deals	Forex Deal Value US\$ Mn	Repo & Repo Variant Deals	Repo & Repo Variant Value (Rs.Cr)
2007-08	19079	95890	188843	1653851	757074	3133665	139889	12059579
2008-09	22683	148166	245964	2160233	837520	3758904	143221	12919070
2009-10	38230	401198	316956	2913890	883949	2988971	170703	21614207
2010-11	44060	605274	332540	2870952	1150037	4191037	172792	16359029
2011-12	51439	591979	412266	3488203	1283178	4642573	173755	14919125

Source: SEBI, CCIL

2. Regulatory and Operational Framework of Indian Corporate Debt Market:

In a recent paper on Indian corporate bond market, Khanna & Varottil (2012) have brought out few impending legal issues that have been coming in the way of developing corporate bond market in India.

- **Contract Enforcement:** Given the Indian legal system's unusual delay in giving appropriate relief to enforce the contract of debt with regard to payment of periodic interest, enforcing collaterals against the debt, bankruptcy, etc. poses serious challenges to attract right kind of investors in the corporate debt market. Prohibitive cost of bring civil action is also another deterrent

(Krishnan, 2010, Khanna, 2010). Borrowers take advantage of the situation in denying remedies to the lenders. World Bank has consecutively ranked India for the last two years at 182 and 183 against the parameter of enforcement of contracts (Doing Business Report, World Bank, 2012).

- **Insolvency Regime:** Liquidation process (an important provision of debt contract) is fraught with significant delays and can take up to 10 years for a company (Shroff & Puri, 2006). Board for Industrial & Financial Reconstruction (BIFR) has been unsuccessful in ensuring timely recovery and rehabilitation (Shroff & Puri, 2006). The Corporate Debt Restructuring (CDR) scheme introduced by RBI to bypass the unusual legal delays in judicial system has not been very successful either (Bhoir, 2012). Foreign lenders are not covered under the scheme. The insolvency regime is spread over several pieces of legislation and among different course and regulatory bodies and this poses serious challenges and does not sound to be cost effective. In a recent communique to the Banks from Government of India in April 2012, it has advised banks to restrict exposure to quasi securities like convertible preference (Cumulative Convertible Preference Shares (CCPS)) shares that have a long tenure, low returns and high provisioning. During 2011-12, disress loans of Rs.6697crores were converted into quasi-equity as against Rs.562crores in the previous year.
- **Standardization and Transparency:** It is imperative in a financial market that investors have sufficient information to price an asset while trading the same. Disclosure standards should be standardized in a manner that brings transparency to the instrument. In India, foreign investors have to follow a different set of guidelines vis-à-vis their domestic counterparts. The current regime is considered insufficient and further steps need to be taken to make the market more attractive to all investors (Adikesavan, 2011). Standardization is important for liquidity in the market. The facility of shelf prospectus and ‘on-tap’ issuances are limited to few entities and hence private placement route with limited disclosures is the cheaper option for the companies to raise debt in the market. No other foreign institutions except SEBI registered FIIs are eligible to invest in corporate bonds.

Given the regulatory framework at present, serious structural changes and suitable legal reforms are needed to provide a strong legal basis to the Indian debt market. Creating better market infrastructure like technology platforms, clearing corporations, etc. are going to help to some extent but legal framework will address issues from a long term prospective and help creating a robust market place. Further, Indian capital market (equity, corporate bonds, other exchange traded products) lacks the

“Finality of Settlement” statutory provisions as it has been kept outside the purview of Payment and Settlement Systems Act, 2009.

Prior studies have established many factors contributing to the slow pace of developments in corporate bond market. Though Debt Recovery Tribunals (DRTs) were established as per a piece of legislation in 1993, the enactment came only in 2002. Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interests Act, 2002 (SARFAESI) brought lot of relief to banks and financial institutions and gave an option for banks to exit their exposures and also helped in providing better credit protection to these credit providers. However, the same was not extended to bond investors. Armour & Lele (2009) have suggested that the bond issuance dropped considerably between 2001 and 2008 while loans extended by banks increased considerably during the period. They have pointed out that equity market reforms have largely been in the regulatory space and can be easily reformed and implemented by regulators who are formed as agencies of the Government while bond market reforms are more in legislative space and difficult to speed up the process. Implementation and enforcement are faster for equity through SEBI while the same may not be true for corporate bonds which required substantial legislative action like unification of stamp duties, better credit protection provisions, and efficient bankruptcy management, etc. Investors investing in bonds and issuers issuing the bonds have to find ways to overcome the relevant tricky issues in the system. The Patil Committee Report has brought out in detail the issues with regard to securitization in India as a viable economic activity. Securitization market is a very large market globally as it allows investors to repackage the assets in the books and sell them as bonds with different rating classes. This helps them to recycle funds in the balance sheet. The securitization model heavily depends on the Special Purpose Vehicle (SPV) as most of the transactions are “Pass Through”. The SPVs must be tax efficient. In India, most SPVs are managed as trusts purely from Tax angle. If the SPVs business is done by a professional corporate entity, the entire inflows may be treated as revenue for Tax purpose. This will make corporate SPVs inefficient and hence model is to have SPVs in the lines of Trusts. However, it is understood that a declaration is needed to be obtained from the investors about the possible future tax liability, if any. In Indian context, the trust deeds may permit the trustees the right of indemnity against taxation, but first, the trust deeds may not be specific as to which beneficiaries to claim such tax on, and two, the beneficiaries may also have gone out of the trust. If the beneficiary ceases to be a beneficiary altogether, it would be questionable whether the trustees’ indemnity at all extends. (Kothari, 2012)

It seems, tax officers have served notices and demands on trustees of Securitization vehicles (SPVs) taxing the entire income of such vehicles. This will have serious implications for the market. If the investors in an SPV (like a Mutual Fund) have already distributed the funds among the unit holders, can they be taxed now? This has given some amount of uncertainty to the market which is under considerable stress.

No corporate debt market can be successful without the development of securitized debt. Globally securitized debt forms the major support system of corporate debt market. In 2006, RBI guidelines on the rated and tradable securitization market (commonly called the pass-through certificate or PTC) helped to move the market towards bilateral sales of loans or portfolios (commonly called “direct assignments”). RBI’s earlier draft guidelines (2010) on minimum risk retention requirements and minimum holding period requirements both for bilateral assignments and tradable Securitization paper have now become the actual guidelines (May 7, 2012) except some changes pertain to Minimum Holding Period (MHP) requirement and credit enhancement reset. These requirements are not expected to have any major impact on the Securitization or assignment of any underlying asset class, as these are relatively easy to comply with. The biggest impact of the Guidelines is expected to be on Direct Assignment transactions that formed about 75% of the market in FY2012. Under the Guidelines, no credit enhancement is permitted for these transactions. Given the prohibition on credit enhancement, the investing banks will be exposed to the entire credit risk on the assigned portfolio, which most banks may not be comfortable with. Hence the volume of such assignment transactions is expected to be severely affected.

3. Market Participants:

There are supply and demand side issues in corporate bond market. The most important supply side issue is dominance of government-owned companies in the market. The debt market in India is dominated by the Government in term of huge issuances. The high level of Government borrowing is crowding out the corporate sector to some extent (Luengnaruemitchai & Ong, 2005). During last few years, Government borrowing in India has been on the rise at an average rate of about 19% during last 6 years or so. The borrowings have increased after the onset of financial crisis and during 2011-12, the percentage growth of borrowing has surpassed earlier years (Table -3).

Table – 3: Outstanding Debt of Government					
Amount in Rs. Crore					
Year	Gilts	T-Bills	Total Outstanding Borrowing	Net Increase	Growth (%)
(A)	(B)	(C)	(D=B+C)	(E)	(F)
Mar-06	1018621	70906	1089527		
Mar-07	1181604	115474	1297077	207550	19.05
Mar-08	1434086	136140	1570226	273149	21.06
Mar-09	1706083	150274	1856357	286130	18.22
Mar-10	2033452	137466	2170918	314562	16.95
Mar-11	2349966	141327	2491293	320374	14.76
Mar-12	2782985	263996	3046981	555689	22.31

Source: CCIL

The gross borrowing of the Government through dated securities alone stood at Rs.5,10,000Crores, Cash Management bills accounted for Rs.93,000Crores. 91-day T-Bills accounted for Rs.4,46,803Crores, 182-day T-bills accounted for Rs.93,601crores and 364-day T-bills accounted for Rs.90,409crores in 2011-12. With regard to secondary market, Government securities outright deals settlement stood at Rs.34,88,203crores for 2010-12 while corporate bonds were only about one-sixth of the same at about Rs.591979crores. In terms of liquidity, Government securities market is far ahead of the corporate bonds. This may be due to regulatory provisions for Banks to hold Government securities as per their Statutory Liquidity Ratio (SLR) requirements as well as preference for holding risk free sovereign assets as a part of diversification mechanism and liquidity management as Government securities have a highly liquid repo market. Though repo in corporate bonds is permitted in India for last few years, only 4 trades have been reported on the said market. Investors' preference for holding sovereign assets in India vis-à-vis corporate bonds reflects the weak credit risk management structure in India which may be due to some of the weak legal provisions in regard to credit protection and delay in disposal bankruptcy cases.

Most of the issuers of the bonds are typically Public Sector Units – predominantly owned and controlled by Government. These entities find it easier to sell their bonds as they are also perceived as sovereign entities with tacit and perceived guarantee on such borrowings. This provides an immense comfort to the investors with respect to possible bankruptcy that may require higher provisioning. Investing in these entities is a workaround to avoid legal impediments (Khanna & Varottil, 2012).

Major bonds issuances in India are done through private placement route. The private placement route requires little disclosures as the market is confined to qualified institutional investors and cheaper vis-à-vis public issuances. The private placement document is generally a brief document that gives brief

details of the issue and the company issuing the bond. As per RBI requirement for Banks investing in the said bonds, investing banks must have the copy of the private placed document along with the bond. After such RBI notification, the private placement documents started to carry more information that is useful to bond investors. Public issue of debt has been tried out in few cases in recent times but the same is less cost effective vis-à-vis private placement. SEBI has, of late, made many investor and issuer friendly changes to public issuance of debt but the same has not been the preferred route as investors are limited to banks and institutions. Unlike a prospectus for public issuances, private placement does not require any statutory disclosure. Since retail investors are absent in this form of the market, private placement has remained the most preferred route for issuers. Since bonds are privately placed with institutional investors, the secondary market liquidity is limited as most of the investors generally hold the bonds till maturity as they have already assumed the risk and the bonds are held in the mark to market category of investment (Held for Trading).

Sound Indian Firms have been trying to raise resources through bonds sell in international markets. These issuances have been done through ECB and FCCB route. The ECB guidelines put restrictions amount to be borrowed, cost of such borrowing, tenure and end-use while FCCB comes under FDI regulations and gives advantages to the issuers. FCCBs allow for convertibility which make is attractive to both issuer and investor. ECB does not allow convertibility. Strong and financially sound companies have raised resources through ECBs while FCCBs have been issued by companies across the spectrum (Babu & Sandhya, 2009). These issuances are also in the nature of private placement but they are not locally issued. A falling market does not augur well for FCCB market as few investors will convert their bonds into equities. In 2011-12, most of the international bond issuances by Indian companies have been done through ECB route. During 2011-12, only 12 companies issued FCCB amounting US\$1.067billion while there were 1060 ECB issues with US\$33.90billion (US\$34.90billion including ECB (Bonds) route (US\$1billion)).

The investors in the corporate bond market are predominantly banks and institutions including FII's with very little or negligible part played by retail investors. Most of the investors prefer to invest in Sovereign bonds rather than corporate bonds due to the risk factor and legal impediments discussed in this paper. Pension Funds and Insurance companies prefer Government securities as they have to provide safe and guaranteed returns. Further unavailability of risk transfer mechanism in the corporate bond market also works as a deterrent. The secondary market in corporate bonds is fraught with many issues:

- Multiple reporting systems – For corporate bonds, investors have to report to Stock Exchange (BSE)/National Stock Exchange (NSE)/ Fixed Income Money Market & Derivatives Association (FIMMDA) reporting platforms. Currently FIMMDA has started F-TRAC which provides reporting facility of CD/CP and corporate bonds. RBI has mandated all Banks and institutions to report all CP/CD deals to F-TRAC system but the same is not true for corporate bonds. This fragmentation creates data mismatch.
- Settlement – Till recently, investors have to settle their deals directly among themselves. Now the investors need to settle their deals through a clearing house.
- Information Dissemination - Warehousing of information is very important for corporate bond investors. Centralized information regarding issue size and other important details like optionality, etc. should be publicly available. Such information is not easily available making it difficult for investors to source appropriate information.
- Credit Migration History – It is necessary for bond investors to have information on credit migration history of a company in a centralized place. Though rating agencies provide such information individually whenever there is a Credit event, but it is difficult to source all information together to effectively price a corporate bond.
- Corporate Bond Yield Curve – Unlike sovereign bonds, there is no corporate bond yield curve dissemination and hence it is difficult to price non-traded bonds in the portfolio. FIMMDA announces the credit spread for each rating class and each issuer class which is required to be used by investors. Since no credible study has been undertaken to test those credit spreads, it is difficult to use them effectively for pricing corporate bonds.
- Probability of Default – Given the lack of credible data on corporate bonds, it is extremely difficult to find out the probability of default for corporate bonds.

4. Challenging Issues:

The most important issue is the availability of reliable information on bond issuances data. There is a need to standardize information and its publication in public domain in a manner that is useful for investors. The Patil Committee deliberated in detail on such necessity but data standardization is not yet fully achieved. Some interesting analysis of the bond issuance data of 2007-08 brings out lot of relevant issues that questions the very foundation of the corporate bond market in India. During 2007-08, as per

the data available with the author, there were 3772 issues by 213 companies and top 10 issuers accounted for 48% of the issue amount. More than 50% of issuances were from NBFCs in terms of the value of issuances (Table – 4).

Group	Market Share (%)
Bank	8.30%
Corporate	18.85%
FI	11.90%
Housing Finance Co	6.44%
NBFC	53.13%
PD	1.37%
Total	100.00%

Source: Author's private calculation

Top 10 issuers were large companies and the largest issuer accounted for 10% of the issuances (value). Top 5 issuers accounted for about 33% of the issues Table – 5). The large issuers have issued multiple bonds/papers during the year. These companies had multiple issues during the year. There were only 18 issues which had more than 100 investors and the rest were having less than 100 investors.

Issuer	Share (%)	Cumulative %	Number of Issues
Company 1	10.09	10.09	181
Company 2	8.75	18.84	193
Company 3	4.94	23.78	41
Company 4	4.64	28.42	60
Company 5	4.61	33.02	164
Company 6	4.00	37.02	82
Company 7	3.74	40.77	183
Company 8	2.43	43.20	13
Company 9	2.32	45.52	41
Company 10	2.10	47.62	8
Total	47.62		966

Source: Author's private calculation

About 2288 issues (60% of the total issues) with about 34% of value had only *single investors* while more than 99% of the issues with 97% of issuance value had only upto 49 investors as required under

the legal provisions for private placement (Table – 6). So there has been concerted effort to issue the instruments through private placement route than the public issuances.

Table – 6: Investor Participation in Issuances		
Investor Category	Issue Value (%)	Issue Numbers (%)
Single Investor in an Issue	34.07	60.66
2 to 5 investors in an issue	15.81	18.77
6 to 10 investor in an issue	33.28	15.83
11 to 20 investors	5.11	2.12
21 to 49 investors	9.65	1.64
More than 50	2.08	0.98

Source: Author’s private calculation

Issues upto 1 year of maturity accounted for 65% of the total issuance value while 2 to 3 months issues accounted for 27% and long term issues like 5 years and above accounted for about 26% of the issue amount. The 5 year segment was dominated by Banks and infrastructure companies. About 50% of the issues had maturity of 6 months or less (Table – 7).

Table – 7 : Maturity profile of Issuances		
Category of Maturity	Market Share (%)	Cumulative %
Less than one week	0.34	0.34
one week to 1 month	13.71	14.05
1 month to 2 months	7.40	21.45
2 months to 3 months	26.91	48.36
3 months to 6 months	1.38	49.74
6 months to 1 year	7.09	56.83
1 year to 2 years	8.42	65.25
2 years to 3 years	3.40	68.65
3 years to 5 years	6.80	75.45
5 years and above	24.55	100.00

Source: Author’s private calculation

The largest issuer company raised 82% of the funds through issuances on daily basis –by one issuance in a day while only 2% have been raised through 4 issues on the day (13% raised through 2 issues in a day and 3% was raised through 3 issues in a day). Average maturity of the instruments issued were only 94 days with average number of issuers per issue is only 2.

If the current market outcome follows the 2007-08 patterns, then we can safely comment that the market has a long way to go if we have to bring liquidity to the market. This type of market will be risky for investors as it misses the most important link – long term nature of the market. The granular data should be available in public domain to make comparative analysis of market maturity so that the bonds can be effectively priced by investor considering the risk involved in the market. Unavailability of information makes this more costly as any investor would expect higher return for the inefficient microstructure risk.

5. Market Dynamics:

Primary Issuances: The paper tries to understand the current market dynamics from both primary market issuances and secondary market trading point of views. In the issuance data publicly available, non-standardized names have created more than one record for the same issuer. For example, CHOLAMANDALAM INVESTMENT AND FIN. CO. LTD and CHOLAMANDALAM INVESTMENT AND FIN. CO. LTD (CHOLAMANDALAM DBS FINANCE LTD) are counted as two different issuers while both refer to the same entity. The data was cleaned to group them as single issuer. During 2011-12, 252 companies raised funds through 2363 bond issuances. These companies issued only 18 perpetual bonds with average coupon of 12.15% (Max coupon 12.75% and min coupon 10.75%). Out of 18 perpetual bonds, only 5 were rated “A” while others were rated “AA”. All these perpetual bonds had “Call” option at the expiry of 10th year subject to the approval of RBI. Financial companies (NBFCs included) accounted for a large chunk of issuers with 69% market share followed by infrastructure companies with 11% market share in number of issuances (Table – 8).

Category/Type	Number of issues	Market Share (%)
AGRO INDUSTRIES	8	0.34
BANKS	113	4.78
FINANCIAL COMPANIES	1636	69.23
INFRASTRUCTURE	255	10.79
MANUFACTURING	205	8.68
SERVICES	117	1.23
OTHERS	29	4.95
Total	2363	100.00

Source: NSDL, Author’s private computation

The issuance statistics shows that most of the issuances are upto 3 years of maturity (61%). The minimum maturity is 0.01 years and maximum is for 20 years with average issuance maturity of 4.14 years. Bonds in 10 years maturity bucket accounted for about 9% (Table -9). Issuers preferred to issue Coupon bearing bonds (79% of bonds) though there were 488 zero coupon bonds (21% of bonds).

Maturity Bucket (Years)	Issues	COUPON BONDS	ZERO COUPON BONDS	Share (%)	Cumulative share (%)
1	100	77	23	4.23	4.23
2	746	427	319	31.57	35.80
3	603	490	113	25.52	61.32
4	236	229	7	9.99	71.31
5	200	191	9	8.46	79.77
6	63	62	1	2.67	82.44
7	55	54	1	2.33	84.77
8	19	18	1	0.80	85.57
9	12	9	3	0.51	86.08
10	205	202	3	8.68	94.75
15	94	89	5	3.98	98.73
20	30	27	3	1.27	100.00
	2363	1875	488	100.00	

Source: NSDL, Author's private computation

The issuance structure in terms in terms of number of issuances has remained more or less like 2007-08. The largest issuer had 5.6% of the total issues while Top 10 issuers were Finance companies with 35% of the issues. With regard to the Rating structure of the issues, the investment grade securities were dominant in the market and higher grade A-class securities (A, AA and AAA) accounted for 84% of the number of issuances. However, there was no information available on about 15% of the issuances with regard to their Rating class (this was after using the Trading data to extract Rating information which was missing in issuers data and vice versa). Below investment grade securities have little demand and preference. This may be so as we have concentrated on a particular year with high interest rate regime due to many domestic and international factors – European sovereign debt crisis, unstable equity markets, persistent domestic liquidity problems, dominance of high level of domestic sovereign borrowings, absence of a liquid risk transfer market like Credit Default Swap market, etc. From the information, we could make out that some of these issues were rated by Rating Agencies (as their

names have been given in the data) but the Rating of the issue is not provided in the data released in public domain. Only 8 issues were unrated issues in the data (Table – 10).

Table – 10: Issuance in terms of Rating Class			
Instrument	Rating	Share (%)	Cumulative Share (%)
AAA	612	25.90	25.90
AA	1240	52.48	78.37
A	132	5.59	83.96
BBB	15	0.63	84.60
BB	7	0.30	84.89
C	1	0.04	84.93
NA	344	14.56	99.49
UR	8	0.34	99.83
P1	3	0.13	99.96
P2	1	0.04	100.00
Total	2363	100	

Source: NSDL, Author's private computation

The issuance concentrated in straight bonds (coupon and zero coupon bonds) though only 461 bonds had floating rate structure and bonds were linked to the performance of stock indices like NSE NIFTY or a particular underlying stock and 12 bonds were linked to Gold returns and 1 each were linked to Silver returns and NSE MIBOR (Mumbai Interbank Offer Rate). Only 2 bonds had convertible structure with 14 bonds did not have information about their coupon. Out of 2363 issuances, only 488 bonds were zero coupon bonds. Major issuers were comfortable with bonds without put call options (1918 issues) while only 445 issues has embedded options out of which a majority had Call options giving benefit to the issuers to call the bond if the interest rate moves in favour of them. There are some complex structure bonds issued during the year. Example of one of such complex structures is as follows:

- If the Company achieve projected income & net profit during financial year 2010-11 & 2011-12, entire debentures be redeem by company by issuing fully paid equity shares of Rs.10 each (including premium) by 31st October,2012. In case shortfall in achievement is more than 33.33%, entire subscription amount be repaid by company in 4 equal installment, due for payment by 31/10/2012,31/01/2013,30/04/2013 & 31/07/2013 at a price including subscription amount & redemption premium @20% p.a. compounded annually from the date of disbursement to date of subscription. In case shortfall in achievement is less than or upto

33.33%, subscription amount would be redeemed proportionate to shortfall in 4 equal installments, due for payment by 31/10/2012, 31/01/2013, 30/04/2013 & 31/07/2013 at a price including subscription amount & redemption premium @20% p.a. and balance subscription amount is converted into fully paid equity shares of Rs.10 each at a price including appropriate premium by 31/10/2012.

During 2011-12, there were 1463 bond issuances for which coupon/implied yield could be extracted from the data in order to study behavior of cost of funding for various groups of issuers. Two records were dropped from the dataset as its coupon was stated to be 0.01% and 0.001% finally making the dataset to be 1461. The bond issuers were classified into various groups according to their business activity. It was found that Banks issued bonds with at the lowest average yield of 9.92% with an average maturity of 7.39 years while Services companies (mainly PSU units like Electricity Boards, etc.) could raise funds at cheaper rates at 10.07% and while infrastructure companies issued bonds with an average coupon of 13.03% with maturity of 4.09 years. Surprisingly, infrastructure companies issued bonds with lesser maturity as against manufacturing companies and banks. This may be due to the fact most of the housing / building construction companies have raised funds during the year and due to the depressed market conditions prevailing in the market, these companies were perceived as more risky. Banks were considered the safest investment class by the investors in terms of the Relative Risk Indicator (Table-11).

Type	Issues	Average Maturity (Years)	Average Yield/Coupon (%)	Relative Risk Indicator*
AGRO	7	4.13	12.50%	3.03
BANK	111	7.39	9.92%	1.34
FIN	792	3.73	10.91%	2.93
INFRA	224	4.09	13.03%	3.19
MFG	199	6.05	10.92%	1.81
OTH	28	4.51	11.60%	2.57
SERVICES	100	5.52	10.07%	1.82
Total	1461	5.06	11.28%	2.23

Source: NSDL, Author's private computation

*Relative Risk Indicator = Coupon Rate*100/Maturity

A granular analysis of the data shows that there is substantial difference in yields between bonds of various rating grades. The difference between yield of AAA and AA bonds in infrastructure companies and Banks were comparatively lower vis-à-vis other group of issuers. (Table -12)

Table – 12: Descriptive Statistics of Maturity and Coupon profile of Issuances across Issuer Groups

Panel : AGRO COMPANIES									
Rating	Issues	Average Maturity (Years)	Average Yield / Coupon	Standard Deviation - Maturity	Standard Deviation - Rate	Maximum Maturity	Maximum Yield / Coupon	Minimum Maturity	Minimum Yield / Coupon
A	4	4.25	13.00%	0.65	0.00%	5.01	13.00%	3.50	13.00%
NA	3	4.00	12.00%	1.00	0.00%	5.00	12.00%	3.00	12.00%
Panel : BANKING COMPANIES									
AAA	93	4.39	9.42%	2.71	0.18%	15.01	9.75%	3.00	9.00%
AA	13	10.39	9.66%	1.39	0.44%	15.01	10.50%	10.00	9.20%
A	2	8.01	11.40%	2.83	0.00%	10.01	11.40%	6.01	11.40%
NA	3	6.78	9.22%	3.08	0.45%	10.34	9.73%	5.01	8.90%
PANEL : FINANCIAL COMPANIES									
AAA	135	5.12	9.96%	3.49	0.67%	15.01	12.00%	0.85	7.51%
AA	542	3.92	10.67%	3.11	0.81%	15.02	13.25%	0.01	4.65%
A	40	4.90	11.65%	3.81	1.16%	12.01	13.70%	0.25	9.10%
BBB	10	4.66	12.60%	3.45	1.86%	10.01	14.40%	2.00	8.89%
BB	3	4.53	12.08%	2.75	2.27%	7.00	14.50%	1.57	10.00%
NA	58	4.77	10.08%	2.82	1.64%	10.01	12.75%	1.00	2.00%
P1	3	0.93	10.54%	0.07	0.07%	1.00	10.62%	0.85	10.50%
P2	1	1.00	9.70%			1.00	9.70%	1.00	9.70%
PANEL : INFRASTRUCTURE COMPANIES									
AAA	102	4.32	9.68%	3.27	0.29%	15.01	11.00%	1.01	8.70%
AA	35	7.75	9.86%	4.27	1.36%	17.01	12.75%	1.25	7.51%
A	28	4.59	11.96%	0.91	2.07%	6.01	15.50%	3.00	5.60%
BBB	3	1.43	14.83%	1.14	2.02%	2.17	16.00%	0.11	12.50%
BB	3	3.50	16.67%	0.87	1.53%	4.51	18.00%	3.00	15.00%
UR	1	2.99	12.50%			2.99	12.50%	2.99	12.50%
NA	52	4.05	15.70%	3.32	3.49%	15.01	25.17%	1.01	10.00%
PANEL : MANUFACTURING COMPANIES									
AAA	123	11.71	9.42%	4.27	0.21%	20.01	10.09%	4.00	9.00%
AA	29	4.76	10.56%	3.34	0.90%	15.01	11.80%	0.99	8.00%
A	22	5.44	12.45%	2.21	0.80%	10.01	14.56%	0.99	11.00%
BBB	1	5.01	10.75%			5.01	10.75%	5.01	10.75%
NA	24	3.35	11.43%	2.95	2.80%	15.01	16.65%	0.25	5.00%
PANEL : SERVICES COMPANIES									
AAA	42	7.07	8.44%	5.14	1.69%	20.01	11.00%	1.01	6.00%
AA	18	4.28	11.26%	1.71	0.58%	7.01	12.00%	1.00	9.90%
A	19	5.50	11.41%	3.87	2.04%	15.01	13.40%	0.50	5.00%
NA	21	5.21	9.14%	3.86	3.38%	15.01	18.00%	1.08	6.00%
PANEL : OTHER DIVERSIFIED COMPANIES									
AAA	10	4.00	9.88%	1.06	0.22%	5.01	10.25%	3.00	9.60%
AA	1	10.00	11.50%			10.00	11.50%	10.00	11.50%
A	3	1.00	12.50%	0.00	2.00%	1.00	14.50%	1.00	10.50%
NA	14	3.06	12.54%	1.41	4.97%	6.00	20.00%	1.00	6.50%

Rating is an important parameter for corporate bond risk premia. Higher rated bonds typically warrant lower coupon than low rated bonds. We have taken bonds for which rating information were available (1286 bonds) and tried to find out the structure of risk premia for each rating class. We found that bond investors determine price of bonds on the basis of rating information. It is also observed that market is obsessed with AAA and AA rated bonds as an investment class and hence the coupon is significantly lower as investors consider it safer investments. Other rating categories have reasonable risk premia (Table – 13).

Credit Rating	Issues	Maturity (Years)	Coupon / Yield (%)	Gilts Comparable Maturity (Year)	Yield of Comparable Gilts (%)	Risk Premia (%)	Premia over Rating Class (%)
(A)	(B)	(C)	(D)	(E)	(F)	(F)= D - F	(G)=D2-D1
AAA	506	6.56	9.54%	6.5	8.40%	1.14%	
AA	638	4.32	10.62%	4.5	8.39%	2.23%	1.08%
A	118	4.96	11.90%	5	8.40%	3.50%	1.27%
BBB	14	3.99	12.95%	4	8.39%	4.56%	1.06%
BB	6	4.01	14.38%	4	8.39%	5.99%	1.43%
P1	3	0.93	10.54%	1	8.29%	2.25%	
P2	1	1.00	9.70%	1	8.29%	1.41%	

Source: NSDL, Author's private computation

We have tried to understand if the market has been efficiently pricing the bond issuances by looking at the cost of funding. Cost of funding (coupon of the bond) will depend on many factors of risk - maturity, optionality, Rating class, type of issuer, etc. The regression equation used for finding out the relationships is:

$$Coupon = \alpha + \beta_1 * Optionality + \beta_2 * Rating + \beta_3 * Maturity + \sum_{i=2}^7 \gamma_i * CompanyType_i + \varepsilon \dots (1)$$

We did not find any significant relationship of coupon with optionality of the bond. The regression found that the Rating has significant relationship with coupon. Lower rating demanded higher coupon as the relationship shows (positive relationship as numerical value of lower rating is more than the numerical value of higher rating). The coupon/yield was having a negative relationship with the maturity. This means, the higher maturity bonds demanded relative lesser yield but lower maturity bonds demanded higher coupon/yield. This may be due to the fact that we had selected the year 2011-12 which witnessed unprecedented liquidity shortage and short term rates were higher than the long term rates

in the market which has been captured in the regression results. We used dummy variables in the regression for type of issuers (Table-14).

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.10402	0.00534	19.46*	<.0001
Optionality	-0.00063992	0.00079860	-0.80	0.4231
Rating	0.00938	0.00039381	23.81*	<.0001
Maturity	-0.00020481	0.00007649	-2.68*	0.0075
BANKS	-0.01803	0.00503	-3.59*	0.0003
FINANCIAL COMPANIES	-0.01385	0.00490	-2.89*	0.0039
INFRASTRUCTURE	-0.01432	0.00495	-2.87*	0.0042
MANUFACTURING	-0.01429	0.00497	-2.87*	0.0041
SERVICES	-0.01968	0.00502	-3.92*	<.0001
OTHERS	-0.01050	0.00555	-1.89***	0.0587
Adj R-Sq	0.3939			

* significant at 1%, ** significant at 5% and *** significant at 10%

We tried to create different panels for various Types/Groups of bond issuers to estimate the relationship of coupon with other variables among the various classes of bond issuers (Table – 15).

Type Panels	Obs	ANOVA - F Value	Dependent Mean	RMSE	Coff of Var	Adj R-Sq	Intercept	Optionality	Rating	Maturity
BANKS	108	36.75*	0.0948	0.0025	2.66	0.50	0.088 [0.00093] (95.71)*	-0.0011 [0.00052] (-2.08)**	0.0074 [0.0007] (10.37)*	-0.0004 [0.0001] (-3.83)*
FINANCE	735	44.56*	0.10621	0.0087	8.24	0.15	0.0911 [0.0027] (33.25)*	0.0019 [0.0011] (1.70)***	0.0058 [0.0005] (11.51)*	0.0001 [0.0001] (0.51)
INFRA	171	64.83*	0.1030	0.0118	5.52	0.76	0.0912 [0.0054] (17.05)*	-0.0029 [0.0025] (-1.17)	0.0132 [0.0010] (13.61)*	-0.0009 [0.00026] (-3.55)*
MFG	175	188.79*	0.09997	0.0055	5.02	0.82	0.0839 [0.0036] (22.83)*	-0.0018 [0.0015] (-1.20)	0.0134 [0.0007] (18.30)*	0.00003 [0.0001] (0.27)
SERVICES	79	16.12*	0.09800	0.172	17.50	0.37	0.0649 [0.0115] (5.64)*	0.0017 [0.0048] (0.35)	0.0167 [0.0025] (6.53)*	0.00025 [0.00044] (0.56)
OTHERS	14	6.89*	0.1056	0.009	8.59	0.58	0.12148 [0.062] (1.96)***	-0.0139 [0.0235] (-0.59)	0.0109 [0.0052] (2.09)**	-0.0014 [0.0029] (-0.50)

* significant at 1% , ** significant at 5% and *** significant at 10%

Note: Numbers in (...) parenthesis are t-stat of the estimates and [...] are standard error

In case of Banks and Finance companies, we found that the embedded optionality was significant at 5% and 10% level respectively for determining the coupon/yield rate while for other groups, the same was not significant. However, for Banks, the relationship was negative while for Finance companies the

relationship was positive. For Banks, higher coupon was paid for embedded bonds (Numerical value =1 in regression) while for Finance companies higher coupon was paid for non-embedded bonds (Numerical value =2 in regression). The results are justified because banks were considered safe bet for investment while Finance companies were considered relatively more risky and hence higher coupon were demanded by investors. Since bank bonds were considered safer assets and can be compared with sovereign securities (given the very low and negligible rate of Bank failures in India), any embedded option (mostly giving call rights to issuers) were considered more risky in comparison to bonds having no embedded options. Rating was found to be significant and the directions were same for all groups. With regard to maturity, it was found that the yield was indirectly related to maturity for Banks and infra companies (where it was found to be significant) validating our earlier findings of such relation due to high liquidity shortage in the market.

Secondary Market: Corporate bond trading in the secondary market during 2011-12 is considered for analysis in this paper. Secondary market trading in corporate bonds is done in OTC environment but these trades are reported to multiple platforms – NSE, BSE and FIMMDA. Currently FIMMDA runs T-TRAC platform that facilitates reporting of OTC deals in corporate bonds, CPs and CDs. However, RBI has mandated reporting of trades in CPs and CDs through T-TRAC platform but traders have choice of reporting of corporate bonds deals to BSE or NSE if the deal is done through brokers and if the traders are directly dealing, then they can report the deals to F-TRAC. Settlement (T+2) is done through one of the clearing corporations of the Exchanges. The reported deals data have many inherent problems – non-standardized prices and yield reporting, information on Credit rating, names of the issuing companies, etc. The corporate bonds deals are concentrated in few issuers. Top 10 issuers account for about 56.50% of the total number of trades. In Top 10 category, we found that 9 companies belong to Government sector and only 1 was a private company (Table – 16).

Table – 16: Trading Incidence of Corporate Bonds - Transactions	
Top “n” Issuers	Market Share (%)
Top 1	9.74%
Top 5	38.66%
Top 10	56.50%
Top 15	64.87%
Top 20	70.20%

Source: NSDL; Author’s private calculation

In order to understand how markets perceive risk while trading the bonds, we found that Banks are perceived as less risky and financial companies are considered relatively more risky while comparing their YTM. In terms of their relative riskiness measured in terms of Yield to Time to Maturity ratio, Service Providing companies scored higher as the data contained many firms which are owned by Sovereign States (like Electricity boards, etc.). Manufacturing firms and Banks were close to each other. Infrastructure firms and other diversified groups like holding companies were considered very risky in terms of investment. The same result was also found in issuance structure of corporate bonds (Table - 17).

TYPE	Number	Average Tenor	Weighted Avg. Yield	G-Sec Base Yield (FIMMDA)	Spread over G-Sec	G-Sec yield (CCIL)	Relative Riskiness
BANK	1	6.29	9.48	8.49	0.99	8.38	1.51
FINANCE	2	5.24	10.00	8.49	1.46	8.37	1.91
INFRA	3	4.41	9.85	8.48	1.34	8.36	2.23
MFG	4	6.73	9.56	8.55	1.01	8.41	1.42
OTH	5	3.42	9.78	8.44	1.34	8.33	2.86
SERVICES	6	11.03	10.05	8.65	1.41	8.50	0.91
AVERAGE		6.19	9.79	8.52	1.26	8.39	1.81

Source: Source: NSDL; Author's private calculation

Note: G-Sec Base Yield is the appropriate yield of comparable Government securities incorporated by FIMMDA at the time of data release; G-Sec yield is the comparable yield of appropriate Government securities out of estimated sovereign yield curve (YTM) of CCIL

To understand the dynamics of secondary market trading in corporate bonds, we had to clean the data set which contained insufficient information for many trades – like missing Credit Rating information, negative yield, wrong price (some bonds were reported traded price of more than 200). During 2011-12, 16296 valid trades were reported to various platforms. There are apparent duplicate trades reported for the same securities in multiple platforms which were cleaned for analysis. This has to be done physically and after ascertaining if the same was a duplicate trade. The major trades were for fixed coupon bonds (16064 deals) and only a few deals were for floating coupon bonds (232 deals). We dropped 733 records for incomplete information though every effort was made to collect information from issuance data using the ISIN number as the key (like getting Rating information from issuance table for some bonds for which the same was missing in trading data). We had 15563 records finally with 40159 deals. However, we found that no systematic record exists for Rating Migration incorporation in the data for trading. The data cleaning was the most painful exercise for this study.

Trading in corporate bonds concentrated in AAA rated bonds which accounted 89% (81% of deals – multiple deals in same bond) and 99% of the deals were in the first 3 A group rated securities (A, AA and AAA). We found that while trading, the market fairly prices the rating information even though the trading liquidity is very low in most of other rating class. To our surprise, we found that yield in BBB class of bonds were lower than A rated bonds. This may be possible due to two reasons: (a) the trading might have happened on days when the general yields in the market were relatively lower and (b) since the market is an OTC one, the dealing parties might have agreed to do the deal at that yield due to many other considerations. However, no specific conclusion can be drawn from the said yield abnormalities as the market is highly illiquid for BBB rated bonds vis-à-vis A rated bonds. The lower rated bonds (below investment class BB rated bonds), though only few trades happened, had to offer significant yield to investors (Table – 18).

Table – 18: Trading Behaviour - Rating Class and Spread								
	Tenor	Weighted Avg. Yield	G-Sec Base Yield	Spread over G-Sec	G-sec yields	Spreads	Bonds Traded	Spread over Class
AAA	5.8119	9.6063	8.5064	1.0992	8.3824	1.2239	11410 (32497)	
AA	4.2947	10.2400	8.4750	1.6993	8.3524	1.8877	301 (5328)	0.6337
A	10.3145	10.4489	8.6260	1.7986	8.4727	1.9762	1044 (2178)	0.2089
BBB	7.1802	10.0858	8.4486	1.6372	8.3834	1.7023	90 (120)	-0.3632
BB	3.2962	14.3868	8.4458	4.7169	8.2777	6.1091	18 (36)	4.3010
Average	6.1795	10.9536	8.5003	2.1902	8.3737	2.5798		1.1951

Note: number in parenthesis gives the number of deals

With regard to trading behaviour of individual bonds, we found that few bonds were having relatively higher level of liquidity purely on the basis of their high incidence of trading. During the year, 1803 ISINs were traded with 40159 deals. One bond was traded on 180 days during the year (238 trading days in our sample). The most liquid ISIN in terms of number of deals was traded on 142 days during the year. The study also found that there are certain sporadic trades on few ISINs. Few bonds were traded in large numbers but only on a single day. One ISIN was found trading on only 3 trading days with total 103 deals on the bonds. These sporadic deals may have been arranged deals between participants for certain specific purpose like balance sheet cleaning and moving the bonds to another counter party or group of counter parties which is likely to hold it till maturity (Table – 19).

ISIN of the Bond	Days Traded	Total No Of Trades during the Year
INE020B08591	142	1574
INE134E08DQ6	149	1572
INE062A08058	180	1305
INE020B08641	89	1279
INE941D07125	120	979
INE134E08EA8	66	751
INE053F09HR2	90	709
INE134E08DS2	108	671
INE134E08DR4	102	553
INE340M08012	79	466
INE136E07FB0	1	65
INE915D07LP7	3	103
INE915D07NS7	1	63
INE915D07IZ2	1	46
INE915D07NC1	1	39
INE915D07MM2	1	29
Total	238	40159

We tried to understand if the yield of a bond is related to parameters like Rating, structures like Fixed or Floating, type of issuer, etc. We tried to estimate the regression model:

$$Yield = \alpha + \beta_1 * COUPONTYPE + \beta_2 * Rating + \beta_3 * Tenor + \sum_{i=2}^6 \gamma_i * CompanyType_i + \epsilon \dots (2)$$

	Coefficients	Standard Error	t Stat	P-value
Intercept	8.61709	0.05475	157.38*	<.0001
COUPON TYPE	0.79938	0.04387	18.22*	<.0001
Rating class	0.46314	0.00850	54.49*	<.0001
TENOR	-0.02165	0.00116	-18.60*	<.0001
BANKS	-0.06533	0.00517	-12.64*	<.0001
FINANCIAL COMPANIES	0.00009	0.01467	0.01	0.9948
INFRASTRUCTURE	-0.00174	0.01098	-0.16	0.8739
MANUFACTURING	-0.07343	0.00759	-9.68*	<.0001
SERVICES	-0.01603	0.00920	-1.74***	0.0814
Adjusted R-square	0.2578			

* significant at 1% , ** significant at 5% and *** significant at 10%

While estimating the above regression equation, we have used dummy variables for type of bond issuers and Other diversified group was considered as Type 1 as it contained trades of bonds of only a

single issuer. The relationship between yield and bond structure (fixed or floating) was found to be positive – higher yield was expected for bonds with floating coupon (higher numerical rank for floating rate bonds=2 and fixed coupon bonds = 1). Investors demanded a higher premia for taking investment decision on bonds having floating rate which is fair. The relation between Rating class and yield was also found to be rational as higher yield were demanded on bonds with lower rating (higher numerical value assigned: AAA for 1, AA for 2, A for 3, BBB for 4 and BB for 5). Yield and Tenor showed a negative relation which was intuitively not correct (Table – 20).

We also created different Panels in terms of Type of issuers and looked at if yield is related to other variables in a rational manner across various types of bond issuers. For all cases, bond structure (floating or fixed coupon) was found to be significant except in case of Banks. As investors consider banks to be relatively less risky as close to sovereign structure (as incidence of actual bank failures in India is negligible), they did not differentiate between floating rate bonds and fixed coupon bonds. Rating has been found to be significant and in the right direction/sign for all class of bonds except for bonds issued by Services sector. Maturity was found to be related to coupon but the sign was found to be rational (Table – 21).

Type Panels	Obs	ANOVA - F Value	Dependent Mean	RMSE	Coff of Var	Adj R-Sq	Intercept	Coupon Structure	Rating	Maturity	DW Stat
SERVICES	338	13.49*	9.78	0.25	2.54	0.10	8.26 (32.00)*	1.48 (5.94)*	0.07 (1.57)	-0.01 (-1.32)	1.09
FINANCIAL COMPANIES	6884	718.77*	10.00	0.80	7.96	0.24	7.78 (99.06)*	1.48 (20.21)*	0.58 (39.19)*	-0.025 (-12.21)*	0.93
INFRA	1723	241.83*	9.85	0.59	5.95	0.30	10.02 (69.18)*	-0.98 (-6.94)*	0.77 (26.76)*	-0.01 (-3.13)*	0.62
MFG	3350	167.50*	9.56	0.48	4.59	0.13	8.54 (58.05)*	0.91 (6.21)*	0.21 (16.78)*	-0.02 (-13.98)	1.12
BANKS	2695	100.85*	9.48	0.42	4.43	0.10	9.27 (170.56)*	-0.06 (-1.11)	0.26 (16.96)*	-0.01 (-4.86)*	1.18

* significant at 1% , ** significant at 5% and *** significant at 10%

- Default Probability of Corporate Bonds:** Default risk of bonds is very important for investors in order to efficiently price the bond. In India, very little information is available on these areas. Credit spread information is provided by FIMMDA on daily basis for various rating category of bonds as well as for various category of issuers. The credit yield curves are neither estimated nor any corporate bond index is available in public domain. If spot yield curves for corporate bonds

are made available, risk neutral probability of default can be easily estimated from these yield curve as sovereign spot yield curves are available from CCIL and NSE. From the trading information of corporate bonds (used only AAA bonds for estimation), we explored to estimate the risk neutral probability of default. Using the traded bonds, we estimated the spot rates using Nelson-Siegel functional form :

$$Y(m) = \beta_0 + (\beta_1 + \beta_2) \left(1 - \frac{e^{\left(\frac{-m}{\tau}\right)}}{\frac{m}{\tau}} \right) - \beta_2 e^{\left(\frac{-m}{\tau}\right)}$$

The spot curves (using only AAA bonds) estimated from this exercise were used to estimate the one period forward rates at every year interval. We also used the CCIL spot rate param values for Government bond market to estimate the spot curve for sovereign securities market which are used to estimate the one period forwards at every year interval. These forwards are used to estimate the probability of survival. The probability of a bond to survive in one year (not getting into default) is given by

$$Prob. of Survival (P_{s1}) = \frac{(1 + r\%)}{(1 + k\%)}$$

Where r is the sovereign forward yield for the term and k is the corporate forward yield of the same term. The probability of default is calculated as (1-Prob of Survival). The cumulative probability of default is estimated as:

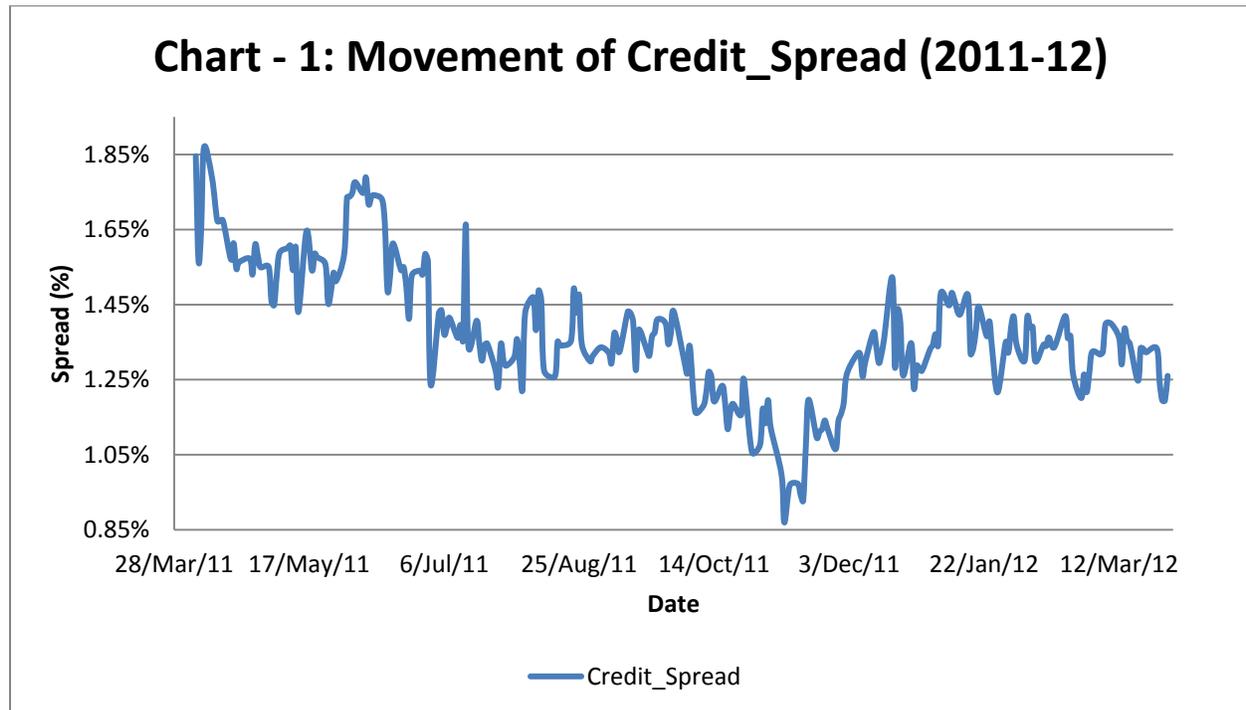
$$Cum P_d = (1 - P_{s1} * P_{s2} * P_{s3}.....)$$

We estimated the same upto 10 years for 2011-12. We found that the probability of default is higher at the shorter end and the same falls at the longer end (Table – 22). The reason may be the uncertainty existing in the short term with respect to liquidity and other macroeconomic factors might be warranting higher probability of default to be factored in yields. We considered upto 10 years as bonds beyond 10 years are hardly traded in the market. Average issuances are also less than 10 years in India during 2011-12 (5.23 years).

Table -22: Probability of Default										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Mean	1.46%	1.42%	1.38%	1.33%	1.28%	1.23%	1.18%	1.13%	1.09%	1.05%
Std dev	0.29%	0.25%	0.21%	0.18%	0.16%	0.15%	0.14%	0.13%	0.13%	0.12%
Max	2.47%	2.04%	1.91%	1.89%	1.85%	1.78%	1.68%	1.58%	1.48%	1.41%
Mean	0.93%	0.92%	0.86%	0.81%	0.78%	0.74%	0.72%	0.70%	0.67%	0.66%
Median	1.39%	1.37%	1.35%	1.32%	1.27%	1.23%	1.19%	1.14%	1.09%	1.05%
Cumulative Probability of Default										
Mean	1.46%	2.86%	4.21%	5.48%	6.69%	7.84%	8.93%	9.96%	10.94%	11.87%
Std dev	0.29%	0.53%	0.71%	0.86%	0.99%	1.10%	1.19%	1.27%	1.34%	1.41%
Max	2.47%	4.44%	6.17%	7.72%	9.17%	10.55%	12.02%	13.38%	14.64%	15.81%
Mean	0.93%	1.84%	2.74%	3.60%	4.36%	5.07%	5.75%	6.41%	7.04%	7.65%
Median	1.39%	2.77%	4.06%	5.32%	6.53%	7.66%	8.74%	9.80%	10.77%	11.71%

Source: CCIL, Author's own calculation

7. **Corporate Credit Spread:** The spot curves derived for both corporate and Government securities are used to calculate the credit spread for each maturity term. Daily average credit spread was obtained for 2011-12 (238 trading days) (Chart -1).



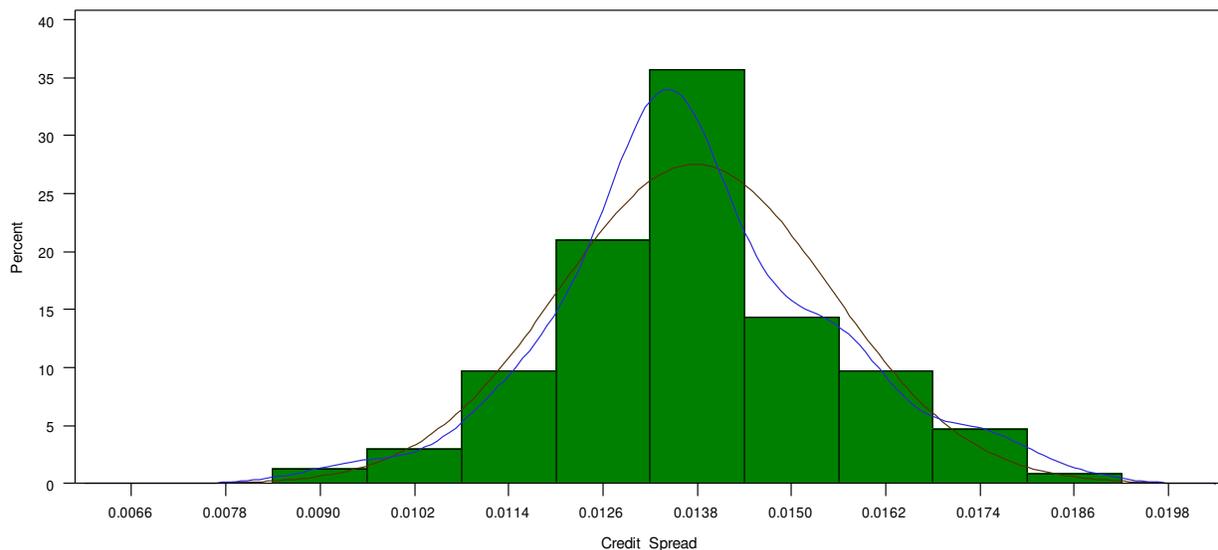
The spread varied between 87bps to 187bps (Table -23). The average spread was 138bps and the median spread is 135bps.

Mean	0.013773
Standard Error	0.000113
Median	0.013553
Standard Deviation	0.001738
Sample Variance	3.02E-06
Kurtosis	0.448757
Skewness	0.194702
Range	0.009987
Minimum	0.008695
Maximum	0.018682
Count	238

While looking at the relationship between the credit spread of the liquidity measured by volume and/or number of deals during the day for the AAA bonds, we did not find any significant relationship between them – either individually or volume of trades and number of deals together. The R-square was very low at 0.033. The credit spread for 2011-12 for AAA securities were close to a normal distribution (Table – 24 and Chart -2).

Test	Statistics		p Value	
Kolmogorov-Smirnov	D	0.07429	Pr > D	<0.010
Cramer-von Mises	W-Sq	0.33396	P > W-Sq	<0.005
Anderson-Darling	A-Sq	1.68439	Pr > A-Sq	<0.005

Chart - 2: Daily Credit Spread (AAA Bonds) - 2011-12



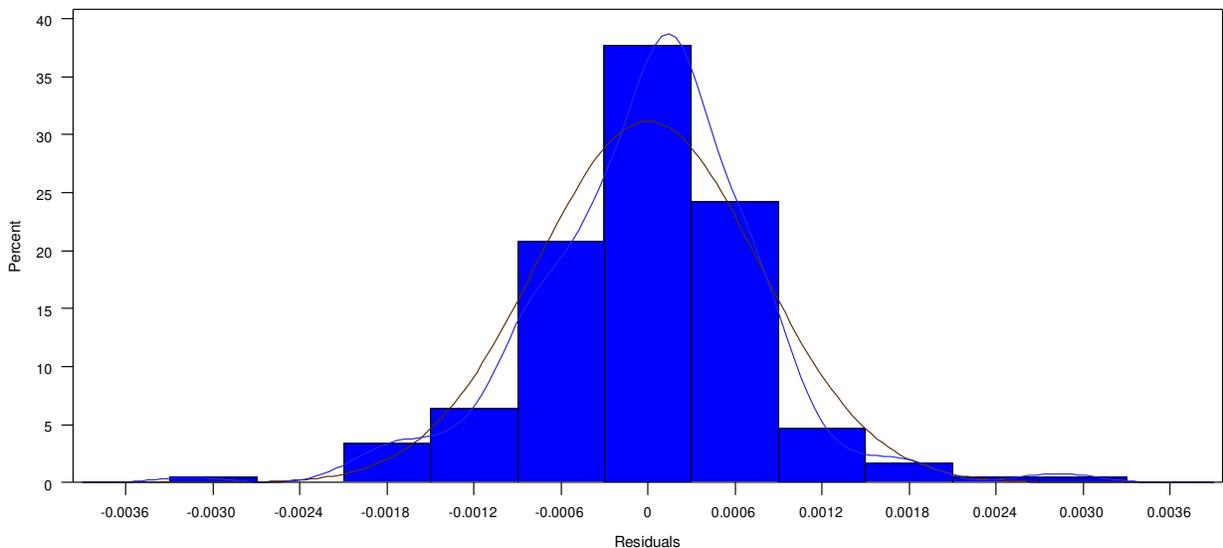
We tried to find out if the credit spreads depend on past information on credit spreads. We found that lags beyond 2 days are not significant and they do not change the R-square of the estimated equation significantly. Hence we restricted our estimation to only 2 lags. We also considered the change in the slope of the sovereign yield curve to see if the same has any effect on spread. The slope parameter was estimated as the difference between the 10 year and 3-months sovereign spot yields. We found that the Adjusted R-square dropped very marginally (from 79.73% to 79.71%). We tested the regression equation:

$$Spread_t = \alpha + \beta_1 * Spread_{t-1} + \beta_2 * Spread_{t-2} + \beta_3 * Slope_t + \varepsilon \dots(3)$$

The residuals were tested for their behavior and found to have a mean of 0 and standard deviation of 0.00077 (close to 0.1%). The Goodness of Fit tests for normal distribution for residuals were found to be acceptable (Table – 25 and Chart - 3).

Table – 25: Goodness-of-Fit Tests for Normal Distribution for Residuals				
Test	Statistics		p Value	
Kolmogorov-Smirnov	D	0.06972	Pr > D	<0.010
Cramer-von Mises	W-Sq	0.30678	P > W-Sq	<0.005
Anderson-Darling	A-Sq	1.83389	Pr > A-Sq	<0.005

Chart - 3: Daily Credit Spread (AAA Bonds) - Residuals



The credit spread equation above was estimated as dependent variable with lag credit spreads (upto 2 lags) as independent variables. We found that lag credit spreads (upto 2 lags) are significant (Table – 26).

The Durbin-Watson statistics was higher at above 2. Market used the past spreads to price the credit spread they would charge on corporate bonds while trading in the market.

Table – 26: Regression Results (Spread on lag Spread)				
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.00127	0.00043	2.92*	0.0053
Spread (Lag 1)	0.61466	0.06180	9.95*	<.0001
Spread (Lag 2)	0.29038	0.06115	4.75*	<.0001
Slope	0.00629	0.00746	0.84	0.4003
Adjusted R-square	0.7971	DW	2.121	

Root MSE 0.00077185; Coeff Var 5.61542

* indicates significant at 1%

8. Conclusion:

The Indian corporate bonds issuance and trading data provides interesting information with regard to various parameters. The data handling is a challenging exercise as in many cases the important information for efficient pricing of bonds is missing in the data available in public domain. With regard to issuance and trading, AAA bonds dominated the market. With regard to their issuances, it is found that the coupon offered on AAA bond issuances is significantly lower as investors consider it as good as sovereign securities with only 12bps risk premia. We found that other rating categories have reasonable risk premia when they are issued to investors. The market does not trade much of lower rated bonds like A/BBB/BB. The secondary market is generally illiquid. We found that while trading, the market fairly prices the rating information even though the trading liquidity is very low in most of other rating class. Bonds issued by Banks were considered most safe investment by investors and investors were willing to pay for the same. We found that the probability of default is higher at the shorter end and the same falls at the longer end. The reason may be the uncertainty existing in the short term with respect to liquidity and other macroeconomic factors might be warranting higher probability of default to be factored in yields. The study also found that credit spreads behave in a rational manner. The market participants are using the past credit spread information upto 2 trading days lags to price the spread they would demand on the corporate bonds while investing in them.

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