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Corporate Bond Market in India: Issues and Challenges

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The current study is an attempt to plug the gap in literature on corporate debt market in India. The approaches to deal with issues are both analytical and empirical. The progress made on the recommendations of R. H. Patil Committee on corporate bond and securitisation has been delineated exclusively as a sequel to the analysis of issues on this segment of the financial market. Empirical verification of monetary policy transmission through SVAR, volatility spillover through VECH (1,1) confirms that this segment responds to monetary policy in deficit liquidity conditions, and is insulated from overseas influences.

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Introduction

A well developed corporate bond market supports economic development. It provides an alternative source of finance and supplements the banking system to meet the requirements of the corporate sector to raise funds for long-term investment. It is believed that this segment acts as a stable source of finance when the equity market is volatile, and also enables firms to tailor their asset and liability profiles to reduce the risk of maturity. It also helps in the diversification of risks in the system. In view of huge investment requirement for infrastructure sector, the presence of a well developed corporate bond market assumes significance in India. With the declining role of development finance institutions (DFIs), a developed and robust corporate bond market becomes all the more important.

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Corporate bond market is likely to be more beneficial for business having longer term cash flows, where investors may be wary of risks associated with equity and long-term financing from banks may not be easily available [Report on High level committee on corporate bond and securitisation (2005), Singh (2011), Khanna and Varottil (2012)]. Experts argue that India's high growth can be sustained by improving infrastructure and expanding the manufacturing base, and a developed corporate bond market can make both the tasks easier. Furthermore, India is in need of US$1 trillion in the current five year plan for financing its infrastructure. The Bank dominated financial system is unlikely to finance such a high amount; in this context, recourse to the corporate bond market can be helpful (Mukherjee 2013). In India, while the banks still command a sizable presence in the economy, corporate sector is taking recourse to the overseas markets for raising equity, debt and loans. An underdeveloped corporate bond market can abet this trend, thereby increasing the external sector vulnerability. Fortunately, the presence of a big private sector, deregulated interest rates, well developed government securities market, highly developed clearing and settlement system, credible rating agencies, and supporting regulatory structure bode well for the development of the corporate bond market in India.

Corporate bond enhances the risk pooling and risk sharing opportunities for investors and borrowers. Reddy (2002) highlights the argument of Allan Greenspan that 'co-existence of domestic bond market and banking system help each to act as a backstop for the other', and alludes to that 'in a relatively open economy since non-bank intermediation may get located outside the country… the domestic bond market helps in avoiding double mismatches of currency and maturity'. Khan (2012) opines "the capital flows to the country through External Commercial Borrowings (ECBs), while helping the country fund the current account deficits and corporate raise resources at a lower cost, could also become a source of transmission of severe external shocks to the domestic economy". In fact, he also highlighted Greenspan's view that bond market act as a 'spare tyre', and it can provide corporate funding at times when banks ration credit in the face of week balance sheet.

The development of corporate bond market has been a priority in the policy hierarchy for the last few years. The existing literature largely

focuses either on developing this segment of market by reducing the transaction/trading costs involved or identifying an appropriate legal framework. But this paper has gone further to identify factors that influence the movement of the yield in this market. Furthermore, its response to monetary policy, the risk pricing potential of this segment, and its integration with overseas markets have also been examined. Besides these issues, the present study is as follows: Section II reviews the literature on the subject; Section III describes the depth of the domestic corporate bond market *vis-a-vis* that of other countries; Section IV briefly explains the structure of corporate bond market in India; Section V explores the issues and challenges being faced by this segment of the financial market; Section VI makes an appraisal of the progress made on the key recommendations made by R.H.Patil Committee to develop this market; Section VII undertakes empirical analysis and discusses the results in detail; and Section VIII concludes the study.

Section II
Literature Review

Over the last few years, there have been many studies on the development of corporate bond market in India. While a number of studies analysed the reasons for the non-development of this segment and suggest various ways to reduce the cost of doing transactions, other studies focused on the legal requirements for the development of this market. Some of the relevant papers are outlined below.

Eichengreen (2004) documents how the slow development of Asian bond markets is a phenomenon in multiple dimensions. He finds that larger country size, stronger institutions, less volatile exchange rates, and more competitive banking sectors tend to be positively associated with bond market capitalisation. However, in case of Asian economies, strong fiscal balances have not been conducive to the growth of government bond markets. Empirically, he shows that Asian countries' structural characteristics, macroeconomic and financial policies account fully for difference in bond market development between Asia and the rest of the world.

Goswami and Sharma (2011) argue that development of local debt markets in Asia is facing obstacles from the Asian economies' dependence on the banking system, lack of minimum critical mass of corporate bond market to generate interest in bond issuance. The presence of developed

equity markets, comfortable liquidity with the banks and corporations generate inertia, and constrain the development of local debt market. This paper suggests that integrated regional market for local currency bonds can address the issue of critical mass in local debt market.

Sharma and Sinha (2006) highlighting the limitations of reasonably regulated, supervised, capitalised and managed banking system, outline some of the preconditions necessary for the development of India's corporate bond market. They also reveal that same set of institutions act as issuers and investors of corporate bonds in India. However, they see immense potential for securitisation market in India.

Shah, Thomas and Gorham (2008) examine products, market mechanisms, and some other policy issues in the development of corporate bond market in India. They analyse the development of products ranging from state government bonds and PSU bonds to bonds issued by private firms and structured debt products. This paper highlights how the two-fold restrictions, both on buyers as well as on the sellers, are becoming obstacles in the creation of a vibrant corporate bond market. It also describes that the quality of available information on defaults on corporate bond market has actually worsened in recent years, and calls for strengthening the creditors' rights for the development of India's corporate bond market.

Sundaresan (2006) focuses on the need to make structural reforms in the areas of bankruptcy codes, legal contract enforcement, corporate governance and investor protection for the development of corporate bond market in India. It has touched upon the importance of transparency and efficient price discovery process for the development of corporate bond market in India. It also underscores the issue of existence of a reliable and liquid government benchmark yield curve for signalling to the corporate borrower the cost of risk-free borrowing at different maturities.

Section III
Cross-country experience

A cross country analysis shows that the domestic debt securities outstanding is very high (as a proportion of GDP) in case of the USA, Italy, Japan and Korea (more than 100 per cent). The relative size has increased in recent years in almost all the developed countries which have faced the crisis. However, the size of domestic debt market is low in India and China. Despite the crisis, when all countries went for fiscal

stimulus and monetary easing, the ratio has remained mostly stable in India and China. The size of outstanding corporate securities (by FIs and corporate issuers) to GDP is high in the USA, South Korea and Italy. This is very low for India. Among the developed countries, the UK is having a very low ratio. However, in case of China, this has increased from a low of 13 per cent in 2005 to 25 per cent by 2011 (Table 1, 1a and 1b).

Table 1: Relative Size of Outstanding Domestic Debt Securities to GDP

(in per cent)

Year-end	US	China	Germany	India	Italy	Japan	South Korea	UK
2005	164	40	70	35	121	183	100	44
2006	161	44	77	36	136	193	103	50
2007	166	48	79	40	142	203	103	48
2008	172	49	71	34	141	228	93	46
2009	183	51	85	48	151	229	128	71
2010	178	51	79	43	145	250	109	73
2011	175	46	70	33	140	255	103	72

Source: World Economic Outlook and BIS

Table 1a: Size of Outstanding Debt Securities of FIs and Corporate Issuers relative to GDP (in per cent)

Year-end	US	China	Germany	India	Italy	Japan	South Korea	UK
2005	116	13	31	1	47	39	55	14
2006	114	15	35	2	54	38	58	16
2007	119	16	37	4	59	39	58	16
2008	117	18	34	3	63	40	56	15
2009	110	22	38	6	58	37	77	16
2010	96	24	27	6	52	38	63	14
2011	89	25	22	5	51	37	58	11

Source: World Economic Outlook and BIS

Table1b: Size of Outstanding Debt securities of Corporate Issuers relative to GDP (in percent)

Year-end	US	China	Germany	India	Italy	Japan	South Korea	UK
2005	21	2	4	0.5	13	15	30	1.0
2006	21	3	5	0.6	15	15	27	0.9
2007	21	3	6	0.9	15	17	22	0.8
2008	20	4	8	0.6	18	16	23	0.6
2009	22	7	10	1.5	21	16	37	1.0
2010	22	9	11	1.5	18	16	38	0.9
2011	22	9	9	1.1	16	16	37	0.8

Source: World Economic Outlook and BIS

The share of FIs and corporates in the total outstanding domestic debt securities is very high in countries like the USA and South Korea (more than half of the total domestic debt securities). It is low in case of Japan and UK. The share is declining in US, Germany, Japan and UK, which could be attributed to the fiscal and monetary stimulus undertaken by these countries in the aftermath of the global financial crisis (Table 2 and 2a). In case of China and India, this share is increasing consistently. Excluding FIs, the share of corporates in the total outstanding domestic debt securities is very low (except in case of South Korea). It has been increasing consistently in case of China.

Table 2: Share of FIs and Corporates in the Outstanding Domestic Debt securities (in per cent)

	US	China	Germany	India	Italy	Japan	South Korea	UK
Dec-05	71	32	45	4	39	21	55	32
Dec-06	71	34	46	6	40	20	56	33
Dec-07	72	33	47	9	42	19	57	34
Dec-08	68	36	47	9	45	18	61	32
Dec-09	60	43	45	12	38	16	60	23
Dec-10	54	46	34	14	35	15	57	20
Dec-11	51	55	31	14	37	14	57	15

Source: BIS

Table 2a: Share of Corporates in the outstanding Domestic Debt securities (in per cent)

	US	China	Germany	India	Italy	Japan	South Korea	UK
Dec-05	13	4	6	1	11	8	30	2
Dec-06	13	6	6	2	11	8	26	2
Dec-07	12	6	7	2	11	8	21	2
Dec-08	12	8	12	2	13	7	25	1
Dec-09	12	14	12	3	14	7	29	1
Dec-10	12	17	14	4	12	7	34	1
Dec-11	12	20	13	4	11	6	36	1

Source: BIS

Section IV

Corporate Debt market in India

Indian economy has always been dependent on banks for financing. Only in the 1980s, some activity was witnessed in the primary market of corporate bonds, where issuances were undertaken by PSUs, and investment was done by banks and FIs. Earlier, corporates were mostly dependent on DFIs, like ICICI, IDBI and IFCI for financing of their long-term investment. With the conversion of these DFIs into banks, getting the finance for the long-term projects has become a challenge. Banks have managed to perform this role, but their capacity is limited as there are asset-liability mismatch issues in providing long-term credit. Furthermore, over the years, the bank credit as a proportion of GDP is also rising, indicating that banks are getting stretched to finance the growth of the economy (Table 3a). With the cheap availability of funds in the overseas market, the access to ECBs and ADR/GDR route has also become more frequent (Table 3b).

Table 3a: Bank credit@

Year	Bank credit/ GDP (per cent)
2007-08	47
2008-09	49
2009-10	50
2010-11	51
2011-12	52

Table 3b: ADR/GDR and ECB (USD mn)

Year	ADRs/GDRs	ECBs
2007-08	6,645	22,609
2008-09	1,162	7,861
2009-10	3,328	2,000
2010-11	2,049	12,506
2011-12	567	9,984

Source: RBI and SEBI @ Outstanding Bank credit of SCBs at the year-end.

In early 1990s, the Government of India abolished most of the controls that were in place on the interest rates that corporates used to pay while raising capital through debentures. The ceiling on interest rates being fixed by the erstwhile Controller of Capital Issues was done away with in 1992.

The debt market in India comprises broadly two segments, *viz*., Government securities market and corporate debt market. Corporate debt issued by a firm is either in the form of commercial paper (CP) or corporate debentures/bonds (CB). While CP has maturities between one week and a year, corporate bonds have longer maturities. Corporate bonds have some distinct features. They do not necessarily have semi-

annual coupons nor have their cash flows fixed values. They may have some embedded options. Both public and private companies issue corporate bonds. At present, any company incorporated in India, even when part of a multinational group, can issue corporate bonds. However, a company incorporated outside India cannot issue corporate bonds in India. As per SEBI regulation (2008), debt securities mean **non-convertible debt securities** which create or acknowledge indebtedness, and include debenture, bonds and such other securities of a body corporate or any statutory body constituted by virtue of a legislation, whether constituting a charge on the assets of the body corporate or not, but excludes bonds issued by Government or such other bodies as may be specified by SEBI, security receipts and securitised debt instruments.

Recently, the corporate sector is taking recourse more to the debt market than to the equity market. In the corporate debt market, corporate sector raises funds through public issues or private placement routes. Private placement is defined as 'an issue of securities by a company to a select group of persons (less than 50)'. A public issue is an offer made to the public in general to subscribe to the bonds. In debt issues, most of the funds raised are on a private placement basis, though the share of private placement in total debt collection has declined over the years (still constitute more than 90 per cent). It may be added that the public issue of debts has increased substantially over the last few years (Table 4).

Table 4: Resources raised by Corporate sector

Year	Equity Issues (Rs. crore)	Debt Issues (Rs. crore)			Share of Debt in total resource mobilisation	Share of Private placement in total debt issues mobilisation
		Public	Private Placement	Total	(in per cent)	(in per cent)
2007-08	85,427	1,603	1,184,85	1,20,088	68	99
2008-09	14,721	1,500	1,73,281	1,74,781	93	99
2009-10	55,055	1,500	2,12,636	2,14,136	84	99
2010-11	58,158	9,451	2,18,785	2,28,236	81	96
2011-12	12,857	35,585	261,282	2,96,867	95	91

Source: SEBI Handbook of Statistics.

Keeping in view the objective of developing India's corporate bond market, the Government appointed a Committee under late R.H.Patil on Corporate Bond and Securitisation, and the Committee submitted its report in December 2005. Further, in January 2007, the Government identified the respective regulatory jurisdiction of the different regulators on the corporate bond market. SEBI is responsible for primary market (public issues as well as private placement by listed companies) and secondary market (OTC as well as exchange traded) for the corporate debt. RBI is responsible for the repo/reverse repo transactions in corporate bond. Subsequently, it has been decided by the High Level Committee on Capital and Financial markets (HLCCFM) that RBI would regulate issuances of instruments of maturity of less than one year and the Ministry of Corporate Affairs (MCA) would regulate unlisted securities of maturity more than one year.

As per SEBI, as on March 31, 2012, the outstanding value of non-convertible corporate debt was approximately Rs.10.52 lakh crore. Around 95 per cent of these issues are privately placed. Around 80 per cent of these debt issues are also listed on the stock exchanges (nonconvertible debt securities with nominal value of Rs. 8.02 lakh crore were listed on NSE as on April 30, 2012). From the data, it can be seen that the corporate debt market consists of largely privately placed securities which are subsequently getting listed in the exchanges. Corporates prefer raising funds through private placements as against public issues. The disclosures in the case of public issues are more rigorous or onerous. The public issue is a time consuming process also as there is a need for the issue of a prospectus. In private placement, cost structure is adjusted to suit both issuer and investors. The minimum disclosure, customised structures and the fast speed of raising funds through private placement have made this route more attractive for the corporates to raise funds from the market.

In the corporate bond market of India, majority of the issuances are of the 1-5 year tenor. Over the years, the issuance of securities in the shorter term 1-5 year bucket has increased, and dominated the total issuance in the corporate bond market (Rajaram and Ghose 2011). This type of issuances at the lower end shows that the Indian corporate bond market is not fulfilling the desired role of financing the long term investment. At the sector level, finance companies, manufacturing companies, and infrastructure companies dominate the issuance

of corporate bonds in India. Most of the bonds issued are of higher investment grade, and on a fixed rate basis. Indian corporate bond market is characterised by dominance of government owned companies, private placement of corporate bonds, and increasing recourse of the Indian companies to international bond markets. A number of Indian companies issue bonds in overseas markets, and these are largely placed with institutional investors. These bond offerings are not registered with regulators like Security Exchange Commission (SEC), and avail exemptions under different US securities regulations (Khanna and Varottil, 2012). Among these, substantial offerings are in the form of convertible bonds, *i.e*., Foreign Currency Convertible Bonds (FCCBs). While the nonconvertible bonds segment is dominated by blue-chip companies, the FCCB segment is utilised by companies across the spectrum (Babu and Sandhya, 2009, and Khanna and Varottil, 2012). This did not happen in 2011-12, when most of the funds raised were through ECBs and less through FCCBs as a falling share market did not help raising funds through FCCBs (Nath, 2012). However, it may be added that both ECBs and FCCBs bring in their own set of risks.

In the secondary corporate bond market, the private placement securities are traded over the counter. Public issues are listed and traded in capital market segment of the exchange, along with equity shares. Since 2009, all trades in corporate bonds between specified entities, namely, mutual funds, foreign institutional investors, venture capital funds, foreign venture capital investors, portfolio managers, and RBI regulated entities as specified by RBI have mandatorily been cleared and settled through the National Securities Clearing Corporation Limited (NSCCL) or the Indian Clearing Corporation Limited (ICCL). This provision is applicable to all corporate bonds traded over the counter or on the debt segment of Stock Exchanges on or after December 01, 2009. Insurance Regulatory Development Authority (IRDA) has also issued similar guidelines for its regulated entities. However, the provision is not applicable to corporate bonds that are traded in the Capital Market segment/ Equity Segment of the Stock Exchanges (and are required to be settled along with the equity shares). The Reserve Bank (in 2009) allowed the clearing houses of the exchanges to have transitory pooling accounts facility with the Reserve Bank for facilitating settlement of OTC corporate bond transactions on a DVP-I basis (i.e., on a trade-by-trade basis). Under the proposed settlement mechanism, the buyer of

securities transfers the funds from his bank to this transitory account through RTGS. The clearing house then transfers the securities from the seller's account to the buyer's account and effect the release of funds from the transitory accounts to the seller's account.

With the approval of SEBI, reporting platforms have been set up and maintained by BSE, NSE and FIMMDA to capture information related to trading in corporate bonds. Secondary market trading of corporate bonds issued under a public issue takes place in the exchanges along with equities. However, trading of privately placed corporate bonds in the secondary market takes place in OTC category. The deals with value of more than one lakh rupees are reported over NSE, BSE and FIMMDA platforms within thirty minutes of the closing of the deal (the parties also indicate their preferred clearing house for settlement). And this settlement takes place in the clearing houses of exchanges on DVPI basis. Finally, FIMMDA aggregates the trades reported on its platform as well as those reported on BSE and NSE. Though the FIMMDA platform was the latest reporting platform to be instituted, the majority of corporate bond deals are now reported on it. The share of this platform in the total reporting has increased from 41 per cent in 2008-09 to 59 per cent in 2011-12. It could be due to reporting by the RBI regulated entities over the FIMMDA platform.

Secondary market trading is important as it indicates price, credit risk appetite, spread, default probability (Mishkin, 2006). Most of the corporate debt issues in India do not find way into the secondary market due to lack of transparency and standardisation. The diverse set of rules and provisions for different types of investors and instruments do not add transparency to this market. Similarly, there is no public availability of information on individual issuances, outstanding stock, issue size, option availability and rating migration, *etc*. Predominance of private placement is having its effect on the liquidity of secondary market as players are holding the bonds till maturity. Corporate bonds are generally purchased by merchant bankers, and then get offloaded to other financial institutions that hold most of the purchase for meeting their own requirements (like close ended schemes in case of Mutual Funds). The trading pattern in the secondary corporate debt securities market is mostly concentrated in the 1-10 year tenor securities, particularly in the higher investment grade securities. The settlement is on T+0, T+1 or T+2 on DVP I basis without any guarantee of settlement

from the clearing corporations. Though the trading volume is still low for corporate bonds in India, a gradual pick-up has been observed in the recent years. Most of the time, its average daily volume is more than that of some other instruments like commercial paper (CP), treasury bill (TB) and State Development Loans (Table 5). Secondary market trading is mostly concentrated in bonds issued by finance and infrastructure companies.

Table 5:Average Daily Trading Volume in Secondary Market (in October 2012)

Instrument	**Volume** (in Rs. crore)
Central Govt securities	25,903
Certificates of Deposit	9,081
Corporate Bond	3,649
Treasury bill	2,691
Commercial paper	2,297
State Development Loans	343

Source: CCIL Rakshitra

The Reserve Bank permitted the introduction of ready forward contracts or repo in corporate bonds in the Second Quarter Review of the Annual Monetary Policy for 2009-10. The repo in corporate bond was permitted, only in case of listed corporate debt securities rated AA or above and held in demat form. CPs, CDs and Non-Convertible Debentures (NCD) having less than one year residual maturity, were not eligible for repo earlier. All the trading in repo in corporate debt securities is to be on OTC basis. While the repo trades are reported within 15 minutes of the trade on the FIMMDA reporting platform, the same trades are also reported to one of the clearing houses of the exchanges for clearing and settlement. All repo transactions are settled on a T+0, T+1 or T+2 basis under DVPI (gross basis) framework in a non-guaranteed manner. A haircut of 10 per cent for AAA, 12 per cent for AA+, 15 per cent in case of AA was applicable on the market value of the corporate debt security (the hair cut has been reduced by the Reserve Bank to 7.5 per cent, 8.5 per cent and 10 per cent, respectively, in January 2013 and repo has been permitted in CPs, CDs and NCDs of less than one year original maturity). Actual Repo trade in corporate bonds started in December 2010; though these trades are rare occurrence now-a-days.

Section V

Issues and Challenges with the development of Corporate bond market in India

The underdevelopment of India's corporate bond market has some historical perspective. The big companies, at the time of opening up of the economy, saw more benefits from the stock market liberalisation than from the bond market liberalisation (Armour and Lele 2009, Singh 2011, Khanna and Varottil 2012). The built up of debt in the 1970s and the 1980s was in the consciousness of the policy makers. Thus, the development of the bond market did not attract the attention of the policy makers. With the opening of the economy, there was high inflow of FIIs and GDRs, and it strengthened the primacy of equity market (Virmani 2001, Virmani 2006, Khanna and Varottil 2012, Ahluwalia 1999). Furthermore, the equity market liberalisation measures were in the hands of the regulators but the measures required for development of corporate bond market were in the hands of legislatures (Armour and Lele 2009, Khanna and Varottil 2012).

At present, there is miniscule participation of retail investors in corporate bond market, though they are coming gradually. FIIs can buy corporate bonds, but only up to a limit. Though there are instances of bonds selling like hot cakes in public issuances, they are few in number. Infrastructure bonds generated lot of interest with the allowance of Rs.20,000 tax deductions. Similarly, corporate bonds of some financial entities with high standing and robust distribution channel also saw huge subscription in public issuances. These positive experiences indicate that rightly priced bonds along with an incentivised distribution channel can generate the interest of the retail investors. Recently, the Reserve Bank of India has advised banks that at the time of issuing subordinated debt for raising Tier-II capital, to consider the option of raising such funds through public issue to retail investors.

A simplified and low stamp duty structure is an ingredient for building up of a vibrant corporate bond market. In India, now-a-days the secondary market transactions in corporate bonds through demat transfers do not require stamp duties. Nevertheless, stamp duty is still applicable in case of issuance, re-issuance and transfer (if held in physical form) of corporate bonds, and it is higher in comparison with international standards. It is also not uniform across the states.

The Tax Deduction at Source (TDS) policy is not uniform for all investors in corporate bonds. In 2009, the Union Budget announced that corporate debt instruments issued in demat form and listed on recognised stock exchanges are exempt from TDS. However, TDS is still applicable in certain cases. Because of TDS on interest payments, FIIs used to sell the bond before the coupon payment date and then repurchase it after the coupon payment, a practice known as 'coupon washing' in market parlance. In the current financial year, the Government has reduced the withholding tax (to 5 per cent from 20 per cent) in respect of interest on investment made in bonds issued by Indian companies in order to provide broad-based incentive and encourage greater offshore investment in debt market.

In general, bond financing is expected to be easier to obtain than financing from banks (Mishkin 2006). However, Indian banks generally find it convenient to give loans to corporates instead of investing in their bonds. The provisioning norms in respect for loans are easier to adopt than adopting the mark-to-market norms in case of investment in corporate bonds. Similarly, the corporates also prefer to go for bank loans than raising funds from the bond market.

Corporate bonds are usually rated before they come to the market (whether the bond is publicly issued or privately placed). The liquidity in the market for corporate bonds is skewed towards higher investment grade bonds, and there is practically no volume in lower grades. Any issuer trying to raise debt in the market with an issue that has rating of non-investment grade faces problem. The lack of liquidity has been a big challenge for the new entrants in raising funds. All these have created a vicious circle in the development of the corporate bond market.

Indian corporate bond market also sees high number of issues every year. In one single year, there were more than two thousand primary issues, indicating the arrival of more than two thousands new corporate bonds in the market. This huge number makes it very difficult for any corporate bond to remain liquid (Prasanna 2012). The solution to this problem lies in promoting reissuance of the same bonds. However, bunching of issues can create large liability on a particular redemption date, thereby creating asset-liability mapping problems for the corporate. To avoid this situation, back-to-back underwriting arrangement can be made available for ensuring that the large redemptions do not create

problems. It is also being argued to involve PSUs and large corporates with significant amount of outstanding bonds in devising a suitable scheme of consolidation of their issues (Khan 2012).There is also a case for limiting the number of fresh issuances in a year.

The absence of market makers is also another hindrance for the development of corporate debt market in India. In Government securities market, banks and PDs play a big role as market maker with reasonable success (Khan 2012). However, holding high amount of stock of corporate bond is extremely risky; hence there is a need for high incentive to the party whichever is designated to do this role. It may be added that only in January 2013, SEBI has approved merchant bankers, issuers through brokers or any other entity to act as market maker. But without any incentive for them, it is doubtful whether this initiative would succeed.

In corporate bond market in India, the debenture trustees (DTs) are not very effective. DTs only come to the picture at the time of issuance of bonds to ensure that the property charged with the bonds is available and adequate, free from encumbrance; then again at the time of maturity when the property becomes free. The creation of the pool of assets charged with the bonds is not fast in India. The role of DTs can be enhanced by giving them the power of enforcement of contracts. Similarly, they can be made to do investor compliance by disclosing the details of the changing financial conditions of the issuer to the investors. SEBI has recently asked the credit rating agencies (CRAs) to share with the DTs all relevant information about the ratings assigned by them for debt securities and about the issuers of such instruments. With this, a two-way information sharing arrangement between the CRAs and DTs has been put in place. CRAs are now required to inform the DTs if companies issuing debentures do not share information for monitoring of credit quality. DTs are also expected to provide information to CRAs on whether the assets backing the bonds are free of encumbrance and adequate to cover the liability.

There was absence of order-matching platform for corporate bonds, like the NDS-OM platform in G-sec market. The platforms available in the exchanges were just being used for reporting of OTC trades in the secondary market. The creation of a new platform that meets the changed expectation of the market participants was felt (Prasanna 2012).The new platform bringing additional liquidity is not

certain, but it is likely to generate positive externalities like any other infrastructure, and help in making the secondary market of corporate bonds more transparent and robust. Subsequently, all these may bring in liquidity. Generally, participation of institutional players generates liquidity. In January 2013, SEBI permitted the exchanges for setting up of two separate debt segment platforms, one for institutional players and the other for retail investors; which would offer screen based trading with facilities of order matching, request for quote and negotiated trade.

The regulatory prudential norms for the participants in India's corporate bond market also appear restrictive. The banks, MFs and insurance companies face limits on the investment amount and on the rating status of the corporate bonds to make investment in (Khanna and Varottil 2012). For instance, banks are not allowed to invest more than 10 per cent of their total investment portfolio in unlisted non-SLR securities. Similarly, in case of repo in corporate debt securities, MFs are not allowed to invest below AA rated debt securities (Table 6).

The presence of credit enhancements mechanism can promote the primary issuance of corporate bonds. Credit enhancements mechanism assumes that borrower will honour the obligation by inclusion of third party guarantee and additional collateral. This mechanism enhances credit rating and lowers the interest rates on the debt. This is a new concept in Indian corporate bond market. However, it may be added that credit enhancement by banks in any form is not in the best interest of the economy, as it will transfer the risks to the balance sheet of banks. The ultimate objective of reduction of risk in the banks' balance sheet by developing the corporate bond market will not be met. Incidentally, some financial institutions have shown interest in doing credit enhancement recently (Khan 2012). The recent hike in investment limit in credit enhanced bond for FIIs is a step in the right direction.

Presence of a repo market increases the liquidity of the underlying product and in the process increases the investor base for the underlying product. In India, the repo in corporate debt is not taking off due to lack of active participation of MFs and insurance companies. Repo in corporate debt securities was introduced in March 2010. However, so far, trades have taken place only on a few occasions and mostly with volume of less than Rs.100 crore. The liquidity risk associated with corporate bond is not generating comfort for the investors or regulators. The haircut in the case of repo was high. There is also some disagreement among participants on the provisions of global master repo agreements

(GMRA) for the corporate bond repo market. With the recent reduction in haircuts, availability of repo on liquid instruments like CPs, CDs *etc*, and permission to MFs and insurance companies for participation, it is expected that liquidity in the repo market will increase.

Table 6: Norms for investment in corporate debt securities

Participants	Norms
Banks	▪ Banks are allowed to invest up to 10 per cent of their total investment portfolio in unlisted non-SLR securities.
	▪ A bank's investment in all types of instruments, eligible for capital status of investee banks, is not to be more than 10 per cent of the investing bank's capital.
Insurance companies	▪ Not less than 75 per cent of investment in debt instruments in case of life insurers, and not less than 65 per cent in case of general insurers, should be in sovereign debt or instruments having AAA rating for long term (P1+ for short term).
	▪ Insurance companies were earlier permitted in reverse repo transactions in Government securities and corporate bonds within 10 per cent limit of all funds, but recently, IRDA has clarified that the 10 per cent limit is not applicable in case of reverse repo in government securities.
Mutual Funds	▪ A mutual fund scheme is not allowed to invest more than 15 per cent of its NAV in debt instruments issued by a single issuer which are rated not below investment grade (it may extend up to 20 per cent of NAV of the scheme with the prior approval of the trustees and board of Asset Management Company). ▪ A mutual fund scheme is not allowed to invest more than 10 per cent of its NAV in unrated debt instruments issued by a single issuer and the total investment in such instruments is not allowed to exceed 25 per cent of NAV of the scheme.
	▪ Total exposure of debt schemes of MFs in a particular sector shall not exceed 30 per cent of the net assets of the scheme.
	▪ MFs are allowed to participate in repo transactions only in AA and above rated corporate debt securities.
FII	▪ US$ 51 billion can be invested in corporate bond [(a) US$ 1 billion for Qualified Foreign Investors (QFIs), (b) US$ 25 billion for investment by FIIs and long term investors in non-infrastructure sector and (c) US$ 25 billion for investment by FIIs/QFIs/long term investors in infrastructure sector].
Provident fund	▪ Investment in corporate debt is allowed up to 10 per cent of the PF portfolios. Recently, Central Board of Trustees (CBTs) of Employee provident fund Organisation has recommended for hiking it to 40 per cent of the EPFO corpus.

Source: Author's own compilation from various sources.

Recently, there has been demand for giving SLR status to investment in corporate bonds. While SLR status to corporate bond would help banks in terms of higher returns, it would also bring in mark-to-market norms since these bonds are not likely to be given the benefit of hold-till-maturity. It would also make the management of Government's borrowing programme difficult. The SLR status to corporate debt securities would help only big companies with AAA rated corporate bonds. Lower rated issuers would not get any benefit from this measure. Since the banks generally maintain their G-Secs much above the SLR level, it is not certain whether they would go for corporate bonds, even if the proposal is accepted.

The diversified regulations are also affecting liquidity of corporate bonds in the secondary market. Though the SEBI has rationalised regulations for issue and listing of corporate bonds in 2008, shelf prospectus and on-tap facilities are available to public sector financial institutions only. This type of varied treatment does not generate interest for public offering of the corporate bonds (Khanna and Varottil, 2012).

The introduction of Credit Default Swaps (CDS) was expected to provide market participants another tool to transfer risks. Since CDS acts as an insurance against the default of corporate bonds, it will also help in case of bond insolvency. The guidelines on CDS were announced by the Reserve Bank in May 2011. Entities, categorised as users, are permitted to buy credit protection only to hedge the underlying risks on corporate bonds. Other entities, which are eligible to quote both buy/sell CDS spreads, are permitted to buy protection without underlying bond. This product has also failed to take off due to various reasons. Recently, CDS has been permitted on unlisted but rated bonds, also on CPs, CDs and NCDs with original maturity of less than one year.

In India, there is no centralised database on the rating migration of companies issuing bonds, and also on losses incurred by them. This type of database helps investors in making informed investment decision. Taking cognisance of issues pertaining to corporate debt market, SEBI (on January 24, 2013) has announced new guidelines for providing dedicated debt segment on stock exchanges. The dedicated debt segment offers electronic, screen-based trading with facility for order matching, request for quotes and negotiated trades. The trading facility is to be provided using exchange network including access methods such as internet trading, mobile trading *etc*. The debt segment

has two separate platforms for the markets: (i) retail market- a market for listing and trading of publicly issued debt instruments, and (ii) institutional market- a market for non-publicly issued debt instruments. In case of negotiated trades by members of the debt segment, the trades are to be reported to stock exchange within 30 minutes of the trade. As per the new guidelines, all trades are to be cleared and settled through a clearing corporation. For institutional market, all trades are to be settled with T+1 rolling settlement on DVP-I basis using RTGS account. Stock exchanges may opt for DVP-II and DVP-III in future. For retail market, the trades are to be settled with T+2 rolling settlement on DVP-III basis with settlement guarantee. Furthermore, with an objective to have centralised repository for trades in debt instruments, the stock exchanges shall report trade information to a common trade repository. Additionally, market makers have been permitted in the debt segment. Market making can be provided by merchant bankers, issuers through brokers or any other entity specified by stock exchanges and approved by SEBI. In addition, on October 22, 2013, SEBI has issued a circular for the creation of a centralised database for corporate bonds.

In India, corporate bonds are deemed risky as the legal framework for recovering the investment is too lengthy. Also, enforcement of contracts is very poor. World Bank, in its recent Doing Business Report, has placed India at 184 out of the 185 countries as per the enforcement of the contract parameter. It may be highlighted that the time taken to resolve a dispute is 1420 days on an average in India, whereas it is 360 days in case of Hong Kong. This delay is a deterrent for any financial entity trying to invest in the corporate bond. Devising methods to make a secured claim by the lender on the collateral will go a long way in the development of corporate bond market. This can be achieved through faster process of deciding insolvency, winding up and liquidation.

Today, banks can report all data about defaulting firms to a credit information bureau called the Credit Information Bureau of India Ltd (CIBIL). However, there are some financial institutions which are not members of CIBIL. Moreover, the reporting to CIBIL is voluntary. Furthermore, the process of recovering value for the credit on a defaulted loan is lengthy and costly. The government set up Board for Industrial and Financial Reconstruction (BIFR) for revival and rehabilitation of sick undertakings and for closure of non-viable industrial companies. However, its success has been limited. The corporate debt restructuring

scheme introduced by the Reserve Bank for the revival of corporate as well as safety of the money lent by banks and FIs, has also got mixed success. Debt Recovery Tribunals were established to avoid delays with courts in the enforcement for debt owed to banks and FIs. Also the SARFAESI Act of 2002 provides for various ways for the enforcement of security interest by a secured creditor without the intervention of courts. It allowed banks and FIs to enforce their claims extra-judicially, also to exit loans by selling them to an investment entity specialised in debt. The secured creditor was conferred with the power to take possession of the asset to sell to recover their dues. Even with remedial measures, this Act favoured banks and FIs, not regular bond holders (Armour and Lele 2009, Nath 2012). It has also faced constitutional challenges. There have been measures for the general creditors in the form of amendment of Companies Act so that BIFR powers would be transferred to quasi-judicial body National Company Law Tribunal (NCLT) and multiplicity of litigation be avoided. This act has also faced constitutional challenges. As a replacement of the BIFR, now Asset Reconstruction Companies (ARCs) have been created to take charge of the non-performing assets. With some amendments in the securitisation law and a rise in the cap on FDI, ARCs are expected to be more active in the market. Overall, laws relating to corporate insolvency are fragmented. There is an urgent need for comprehensive bankruptcy legislation. These legal impediments are to be addressed, along with creation of market microstructure, to give a boost to this segment of financial market (Khanna and Varottil 2012).

Overall, a multitude of factors ranging from higher costs, procedural hassles, to long legal remedies are obstacles in the growth of corporate bond market in India. The need of the hour is to bring reform in all the above aspects and allow the corporate bond market to take off.

Section VI

Progress on R.H.Patil Committee Recommendations

For the development of the corporate bond market, the Government of India set up a Committee under late R.H. Patil to suggest recommendations for the corporate bond and securitisation. The impediments being faced by Indian corporate bond market were highlighted by the report of the Committee. The following table summarises the recommendations for the development of corporate

debt market only. Although most of the recommendations have been implemented, no progress has been made on some crucial recommendations like stamp duty rationalisation and limiting the number of fresh issuances of corporate bonds in one year (Table 7).

Table 7: Action taken on the Recommendations of R.H. Patil Committee Report

Sr.No	Recommendations	Progress
Development of Primary Market		
1.	▪ Stamp duties on corporate bonds to be made uniform across states, be linked to the tenor of the securities with an overall cap on the stamp duties	▪ No significant progress
2.	▪ TDS rules for corporate bonds to be removed	▪ Almost done
3.	▪ Time and cost for public issuance, and the disclosure and listing requirements for private placements to be reduced and be made simpler	▪ For public/rights issues of debt instruments, rating of one rating agency is permitted instead of two earlier.
	▪ Banks be allowed to issue bonds of maturities over 5 years for ALM purpose (and not for infrastructure only)	▪ Banks are now allowed to issue bonds of any maturities (if it is for subordinated debt for Tier II capital then the minimum maturity is five years).
	▪ Regulatory limits to be set for the banks when they subscribe to bonds issued by other banks so that other entities be encouraged to subscribe to bonds issued by banks	▪ A bank's investment in all types of instruments, eligible for capital status of investee banks, is not allowed to exceed 10 per cent of the investing bank's capital funds.
4	▪ Evolvement of market-makers for corporate bonds	▪ Only in January 2013, SEBI has announced the creation of market makers though they are yet to take shape.
5.	▪ For already listed entities, disclosure to be substantially abridged. Only some incremental disclosures to be made required	▪ When equity of a company is listed, and such company wishes to issue debt instruments, only minimal incremental disclosures are required now.

	▪ The role of debenture trustees to be strengthened	▪ In 2007 August, SEBI made it mandatory for debenture trustees (DTs) to disseminate all information.
	▪ Companies to pay interest and redemption amounts, in respect of corporate bonds issued by them, to the concerned depositories who would then pass them on to the investors through ECS/warrants	▪ Companies now- a-days pay the interest and redemption amounts through ECS .
	▪ Mandatory for the issuers to get privately placed bonds listed within 7 days from the date of allotment	▪ When the issuer has disclosed the intention to seek listing of debt securities issued on private placement basis, the issuer shall forward the listing application along with the disclosures to two recognized stock exchanges within fifteen days from the date of allotment of such debt securities.
	▪ The credit to the demat account within 2 days from the date of allotment to be made mandatory	▪ The credit to the demat account takes up to 15 days.
6	▪ The scope of investment by provident / pension /gratuity funds and insurance companies in corporate bonds be enhanced and rating to form the basis of such investments	▪ Some progress already made (in April 2010, the EPFO trustees were allowed to invest funds in joint sector companies where GOI is having 26 percent stake). ▪ Recently, EPFO has been allowed to invest in bonds of private firms that are AAA rated, listed, have made profit in last five years, and have a net worth of Rs.3000 crore, have declared at least 15 per cent dividend for preceding five years and with maturity period of its bonds at least 10 years.
	▪ Investment guidelines for these entities to be common across different issuer categories	▪ No significant progress

	▪ Retail investors to be encouraged to participate in the market through stock exchange	▪ Awareness programmes are being conducted for investors, ▪ Tax exemption on infrastructure bonds was also another step in that direction, ▪ RBI direction to banks to issue subordinated debt to retail investors is another step. ▪ In January 2013 guidelines of SEBI, a separate dedicated debt segment has been created for retail investors.
	▪ Allowing separate higher limit for FIIs on a yearly basis for investment in corporate bonds	▪ FIIs investment limit has been increased to $51 billion.
	▪ In order to encourage banks to invest in corporate bonds, investment in corporate bonds to be considered as part of total bank credit while computing credit-deposit ratio	▪ No significant progress
7	▪ There should be a guideline limiting the number of fresh issuances	▪ No significant progress
8	▪ Creation of a centralised database of all bonds issued by a corporate. This database is to also track rating migration	▪ There has been some progress (broadly data is available on SEBI website but not in detail as prescribed by the committee). ▪ In October 2013, SEBI has announced the creation of a centralised database but it is yet to take shape.
	▪ Appropriate enabling regulations for setting up and licensing of platforms for non-competitive bidding and order collection for facilitation of an electronic bidding process for primary issuance of bonds	▪ No significant progress.

Development of Secondary Market		
9	▪ Establishment of a system to capture all information related to trading in corporate bonds in real time basis	▪ Reporting platforms are provided by NSE, BSE, and FIMMDA. ▪ SEBI places secondary market trade data on its website at regular interval.
	▪ Different regulators to mandate the entities to report the details of transaction within specified time of the trade to the trade reporting system	▪ To promote transparency in corporate debt market, a reporting platform was developed by FIMMDA and it was mandated that all RBI-regulated entities report the OTC trades in corporate bonds on this platform. Other regulators have also prescribed such reporting requirement in respect of their regulated entities.
10	▪ Clearing and settlement of the trades to be made according to the IOSCO standard (Phase wise movement from DVP1 to DVP3). RBI may grant access of the RTGS to the concerned clearing and settlement entities	▪ DVP I settlement for secondary market OTC trades is already in place (Transitory pooling facility has been provided by RBI). ▪ The guideline of January 2013 have made announcement in the direction for DVPIII.
	▪ Appropriate approvals may be given by the concerned regulators to enable free participation on the trading platform through limited membership by the concerned entities for the purpose of proprietary trading	▪ Scheduled Commercial Banks (SCBs) are permitted by RBI from November 2012 to become members of SEBI approved stock exchanges for the purpose of undertaking proprietary transactions in the corporate bond market.
11	▪ Development of an Online order matching platform for corporate bonds by exchanges or jointly by regulated institutions	▪ Till December 2012, Non-functional (BSE and NSE trading platforms are operational where trade matching are order driven with essential features of OTC market). ▪ A new order matching platform has been allowed in January 2013 by SEBI, and the platform of NSE has gone live in May 2013; though it is yet to achieve liquidity.

12	▪ Introduction of tri-partite repo contract, securities lending and borrowing , DVP III settlement and STP enabled order matching system	▪ No significant progress on tripartite repo contract. ▪ DVP III settlement and STP enabled order matching have been allowed by SEBI in the recently approved dedicated debt segment.
13	▪ Reduction in shut period	▪ As per January 2013 SEBI guideline, shut period has been done away with for interest payment, but issuers have been allowed to specify shut period for corporate actions such as redemptions.
14	▪ Unified market convention	▪ All issuers are directed to use interest rate convention of Actual/ Actual, though other conventions are still in practice.
15	▪ Permission for Repos in Corporate Bonds	▪ Permitted by RBI since March 2010 (recently MFs and Insurance companies have been permitted to participate in it by respective regulators).
16	▪ Reporting of the OTC Interest Rate Derivatives, and introduction of the exchange traded derivatives	▪ OTC Interest rate Derivatives trades are being reported over CCIL. ▪ Delivery based Interest rate futures (IRFs) have been introduced in the exchanges, though it is yet to achieve liquidity. ▪ Reserve Bank has recently announced to indroduce cash settled 10 year IRF contracts.
17	▪ Reduction in the market lot from Rs.10 lakh to Rs. 1 lakh	▪ The tradable lot has been reduced to Rs. 1 lakh. ▪ Now with the development of separate debt segment in the exchanges, the lot size for institutional investors has been fixed at minimum Rs.1 crore.

Source: Author's own compilation from various sources.

Section VII

Empirical Works On Corporate Bond Yield Behaviour

The behaviour of corporate bond yield has always been an interesting subject. To delve deeper into it, the generic 5-year-AAA-rated corporate bond secondary market yield is taken (as it is the most liquid one) and its relationship with other financial market variables is analysed. Furthermore, whether monetary policy transmits to the corporate bond market, and whether pricing in Indian corporate bond market adequately reflects risks associated with it, are important issues that need to be understood for the policy making. In addition, the integration of India's corporate bond market with the overseas markets is another area that cannot be overlooked. All these issues are studied in this section.

Methodology and Database

To study the dynamics of monetary policy transmission to the corporate debt market, the study employs structural vector auto-regression (SVAR) approach. In the next stage, the study applies the GARCHM (1,1) methodology to see the potential of corporate debt market segment to price various risks. Lastly, the integration of corporate debt market with overseas markets is analysed through the use of multivariate GARCH model, particularly diagonal (VECH (1, 1)).

This study uses 5-year-AAA generic corporate bond yield (taken from Bloomberg), and tries to identify its relationship with some widely used variables. The financial sector /real sector variables considered in this study are: (i)Secondary market Yield of 5-year AAA rated corporate bond in India (source :Bloomberg);(ii) Secondary market Yield of 5-year G-sec in India (source: Bloomberg); (iii) Secondary market Yield of 10-year G-sec in India (source: Bloomberg); (iv) Call rate in India (source: RBI Handbook of Statistics) ; (v) Index of Industrial production (IIP) (source: CSO); (vi) Wholesale Price Index (WPI) in India (source: Office of Economic Adviser); (vii) Sensex (source: BSE website); (viii) Bank credit in India (source: RBI Handbook of Statistics); (ix) Exchange rate of Indian Rupee *vis-a-vis* US dollar (RBI Reference rate); (x) Moody's yield of AAA corporate bond of USA (source: Federal Reserve Bank of St. Louis).

The choice of these variables is guided by demand/supply and liquidity considerations. The Government security yield is taken as it is risk-free interest rate prevailing in the market. Similarly, Call rate is taken to show the liquidity conditions, and IIP data is taken to capture the conditions prevailing in the real sector.

In this study, some empirical work has been attempted on the behaviour of the corporate bond yield (taking the yield of the most liquid corporate bond as the representative one). For the empirical exercise, Structural vector autoregression (SVAR), GARCH-M (1,1) and Diagonal VECH (1,1) approaches have been applied for examining various issues**.** A brief description of these has been given below.

Structural Vector Autoregression (SVAR)

The main purpose of SVAR estimation is to obtain non-recursive orthogonalization of the error terms for impulse response analysis (Eviews).

The SVAR models can be written as: $Ae_t=Bu_t$ (1)

Where e_t and u_t are vectors having n variables. u_t is the observed (or reduced form) residuals, while e_t is the unobserved structural innovations. A and B are matrices to be estimated.

The structural innovations e_t are assumed to be orthonormal, i.e. its covariance matrix is an identity matrix. This assumption imposes restrictions, and to identify A and B, additional restrictions are identified.

GARCH-M (1,1)

In finance, the return of a security may depend on its volatility (risk). To model such phenomena, the GARCH-in-Mean model adds a heteroscedasticity term into the mean equation. It has the specification

$$y_t=\mu+\delta\alpha_{t-1}+u_t \quad (2)$$

$$\alpha_t^2= \alpha_0 + \alpha_1 u_{t-1}^2 + \beta\alpha_{t-1}^2 \quad (3)$$

If δ is positive and statistically significant, then increased risk, given by an increase in the conditional variance, leads to a rise in the mean return. This δ is the "risk premium parameter'.

The Multivariate GARCH Model

In case of volatility spill-over, the objective is to examine the interdependence of return and co-volatility across markets, by using

MGARCH model. The vector autoregressive process of assets return is given in equation below (in case of two countries). Here the yield of country s (r_{sst}) is specified as a function of its own innovation (ε_{st}) and past own return (r_{sft-1}) for all f= 1,2 and s=f, as well as the lagged returns of other country (r_{sft-1}) for all f=1,2 and s≠f as follows;

$$r_{sst} = \mu_{0s} + \Sigma^{2}_{f=1}\, \mu_{sf}\, r_{sft-1} + \varepsilon_{st} \tag{4}$$

In GARCH models, conditional variance is dependent on its own past and the past of the squared innovations. A standard Multivariate-GARCH (1,1) model is expressed as:

$$\begin{bmatrix} h_{ss} \\ h_{sf} \\ h_{ff} \end{bmatrix}_t = \begin{bmatrix} c_{ss} \\ c_{sf} \\ c_{ff} \end{bmatrix}_t + \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} \varepsilon_s^2 \\ \varepsilon_s \varepsilon_f \\ \varepsilon_f^2 \end{bmatrix}_{t-1} + \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{bmatrix} \begin{bmatrix} h_{ss} \\ h_{sf} \\ h_{ff} \end{bmatrix}_{t-1} \tag{5}$$

where h_{ss}, h_{ff} are the conditional variance of the errors (ε_{st},ε_{ft}) from the mean equations. As the model has large number of parameters to be estimated, Bollerslev, Engle and Wooldridge (1988) proposed a restricted version of the above model with the two square matrices having only diagonal elements. The diagonal representation of the conditional variances elements h_{ss} and h_{ff} and the covariance element h_{sf} can be expressed as:

$$h_{ss,t} = c_{ss} + a_{11}\varepsilon^2_{s,t-1} + b_{11} h_{ss,t-1} \tag{6}$$

$$h_{sf,t} = c_{sf} + a_{22}\varepsilon_{s,t-1}\varepsilon_{f,t-1} + b_{22} h_{sf,t-1} \tag{7}$$

$$h_{ff,t} = c_{ff} + a_{33}\varepsilon^2_{f,t-1} + b_{33} h_{ff,t-1} \tag{8}$$

The same equations are the simplification of the diagonal VECH model as given below:

$$vech\ (H_t) = C + Avech\ (\varepsilon_{t-1}\, \acute{\varepsilon}_{t-1}) + Bvech\ (Ht\text{-}1) \tag{9}$$

Where A and B are ½N (N+1) ×½N (N+1) parameter matrices and C is a ½N (N+1)×1 vector of constants.

Determinants of the Corporate Bond yield

The co-movements of the 5-year-AAA rated generic corporate bond yield with some commonly used variables have been looked into by using correlation analysis and granger causality test.

For this analysis, the IIP, WPI and bank credit were seasonally adjusted by X-11 method. For the 5year AAA corporate bond yield, 10-year G-sec yield, call rate, Sensex and exchange rate, the average monthly figures are calculated. The contemporaneous correlation of all these variables is calculated. The variables which are having correlation within 5 per cent level of significance are considered to be showing relationship with the AAA corporate bond yield (Table 8). The contemporaneous correlations indicate high degree of positive association between AAA corporate bond yield with call rate and G-sec yield. However, the corporate bond yield is negatively correlated with sensex (at 10 per cent level of significance). The correlation result (calculated with the monthly figures of this period) indicates that correlation of corporate bond yield with the WPI, bank credit, IIP and exchange rate is not significant.

Table 8: Correlation of AAA corporate bond yield with other variables (in level)

	AAA5	Call rate	Gsec 10	Sensex	IIPsa	WPIsa	Bank Creditsa	ExRate
AAA5	1							
Call rate	0.67 (0.00)	1						
Gsec10	0.53 (0.00)	0.57 (0.00)	1					
Sensex	-0.24 (0.06)	0.06 (0.64)	0.53 (0.00)	1				
IIPsa	-0.12 (0.36)	0.18 (0.16)	0.41 (0.00)	0.61 (0.00)	1			
WPIsa	-0.04 (0.73)	0.27 (0.03)	0.40 (0.00)	0.43 (0.00)	0.94 (0.00)	1		
BankCreditsa	-0.10 (0.41)	0.22 (0.07)	0.33 (0.01)	0.40 (0.00)	0.93 (0.00)	0.99 (0.00)	1	
ExRate	-0.15 (0.23)	0.05 (0.67)	-0.17 (0.18)	-0.27 (0.03)	0.45 (0.00)	0.63 (0.00)	0.67 (0.00)	1

Note: p values are given in the parenthesis.
IIPsa: Seasonally adjusted IIP, WPIsa: Seasonally adjusted WPI, BankCreditsa: Seasonally adjusted Bank Credit.

For a detailed study of the relationship, causal relationships are analysed in the following section. Before proceeding to test the causal relationship between corporate bond yield and other explanatory variables, all series are tested for unit root. Table No.9 summarises the results of unit root tests on levels of these variables (first with only intercept, and then with trend and intercept).

Table 9 : Unit root test result

Series	ADF test		Phillips-Perron test	
	With Intercept	With Trend and Intercept	With Intercept	With Trend and Intercept
	T-statistic	T-statistic	T-statistic	T-statistic
AAA Corporate bond yield	-2.84	-2.79	-2.23	-2.27
Bank creditsa	2.66	-0.37	3.27	-0.12
Call rate	-2.56	-2.62	-2.72	-2.79
Exchange rate	-0.65	-1.93	0.334	-1.04
Gsec10 yield	-2.61	-2.74	-2.19	-2.29
IIPsa	-1.55	-3.44	-1.54	-3.47
Sensex	-2.55	-2.74	-1.94	-2.04
WPIsa	0.75	-2.76	0.95	-1.80

Note: 5 per cent critical value with only intercept is -2.91 and in case of trend and intercept it is -3.48.

It is evident from the test statistic that all the data series are non-stationary. Thus, the returns of IIPsa, WPIsa, Sensex, Bank creditsa and exchange rate are calculated at the lag one month. The first differences of monthly 5-year AAA corporate bond yield, 10-year G-sec yield and call rate are calculated. All the variables are tested for unit root, and found to be stationary. To analyse the causal relationship among these variables, pair-wise granger causality test is undertaken. The F-statistics and p-values are reported in the table 10.

The result indicate that the call rate, yield in the G-sec market, sensex, exchange rate and WPI granger caused the corporate bond yield in this period. In fact, bidirectional causality is also present between corporate bond and government securities yields. Similar behaviour is evident between corporate bond yield and sensex. To elaborate, a rise in call rate indicates the emergence of scarcity of funds in the inter-bank market, and thereby leading the corporate bond yield to go up.

Table 10: Granger Causality Test Result*

Null Hypothesis	F-statistic	P-value
BANKCREDITsa does not Granger Cause AAA5	1.03	0.419
AAA5 does not Granger Cause BANKCREDITsa	0.77	0.596
CALLRATE does not Granger Cause AAA5	3.47	0.007
AAA5 does not Granger Cause CALLRATE	0.495	0.808
EXRATE does not Granger Cause AAA5	3.92	0.003
AAA5 does not Granger Cause EXRATE	0.83	0.556
GSEC10 does not Granger Cause AAA5	4.876	0.001
AAA5 does not Granger Cause GSEC10	4.038	0.003
IIPSA does not Granger Cause AAA5	0.953	0.467
AAA5 does not Granger Cause IIPSA	1.796	0.121
SENSEX does not Granger Cause AAA5	3.336	0.008
AAA5 does not Granger Cause SENSEX	3.275	0.009
WPISA does not Granger Cause AAA5	4.495	0.001
AAA5 does not Granger Cause WPISA	0.509	0.798

*The granger causality analysis has been done with lag 6 after checking the appropriate lag length through various criteria.

Monetary Policy Transmission to Corporate Bond Market

The monetary policy affects the real economy through the financial market. Hence, financial markets are the connecting link in the transmission mechanism between monetary policy and the real economy. Changes in the short-term policy rate provide signals to financial markets, whereby various segments of the financial system respond by adjusting their rates of return on various instruments, depending on their sensitivity and the efficacy of the transmission mechanism (Report on Currency and Finance 2007). Since corporate bond market is being envisioned as a remedy for many funding constraints afflicting the economy, it is important to see whether monetary policy is having any influence on the corporate bond market.

To analyse the dynamic effects of monetary policy shocks on corporate bond market, the following variables are used: Policy rates (*i.e.* Repo rate, Reverse Repo rate); weighted average call money rate; 10-year generic G-sec yield; 5-year AAA corporate bond generic yield; sensex, exchange rate of Indian Rupee vis-a-vis US Dollar, etc. The daily data of Call money, G-sec yield, AAA-5-year corporate bond

yield, sensex and foreign exchange rate are averaged to get the weekly data. The weekly data are chosen to avoid the problem that arises when one market's closing day coincides with the trading day of another market. With the weekly data, the study is undertaken separately for surplus (December 2008 - May 2010), and deficit (June 2010 - June 2012) liquidity situations. Structural vector auto regression **(SVAR)** approach has been used for this study.

In case of SVAR, the relationship between the structural shocks and the reduced form shocks is given by: $e_t = A\, u_t$. (10)

Here u_t is the observed residuals and e_t is the unobserved structural innovations. To obtain the structural disturbances e_t from estimation of the u_t, elements of matrix A (containing the contemporaneous relationships among the endogenous variables) are identified.

The identification conditions are: (i) Central bank does not respond contemporaneously to shocks in financial market rates; (ii) Call money market responds immediately to changes in policy rate; (iii) G-sec yield is sensitive to policy rate only; (iv) Exchange rate responds to policy rate and Call rate; (v) Corporate bond yield responds to policy rate and G-sec yield; and (vi) Sensex is sensitive to policy rate, call rate, and exchange rate.

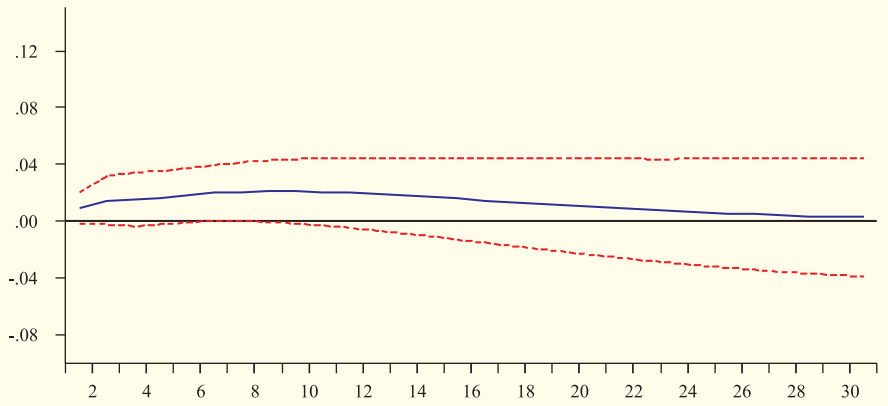
With these restrictions, the above relationship reduces to

$$\begin{pmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \\ e_{4t} \\ e_{5t} \\ e_{6t} \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 \\ a_{31} & 0 & 1 & 0 & 0 & 0 \\ a_{41} & a_{42} & 0 & 1 & 0 & 0 \\ a_{51} & 0 & a_{53} & 0 & 1 & 0 \\ a_{61} & a_{62} & 0 & a_{64} & 0 & 1 \end{pmatrix} \begin{pmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \\ u_{4t} \\ u_{5t} \\ u_{6t} \end{pmatrix} \quad (11)$$

Results

In surplus liquidity situation (December 2008-May 2010), the reverse repo rate is considered as the policy rate and its effect on the corporate bond yield is studied with the presence of above conditions by applying SVAR approach. However, in this case it is very difficult to draw any conclusion on the effect of change in policy rate on the corporate bond yield, as the output from the application is not found to be convergent. It may be added that this surplus period coincides with the global financial crisis of 2008-09, when all sorts of crisis measures were in full swing and the level of surplus liquidity was extremely high. Also, the Reserve Bank of India was on a bond buying spree. Just after the Lehman brothers failure there were many liquidity enhancing measures undertaken by the Reserve Bank. These included CRR reduction by 4

Chart 1: Response of AAA corporate bond yield to Repo rate



percentage points, MSS Buyback, OMO purchase auctions, increase in the export credit refinance limits. All these measures were designed to inject around Rs.5,61,700 crore to the financial system (RBI First quarter Review of Monetary policy 2009-10), and the measures were withdrawn gradually with the return of normalcy. In no other year, so many liquidity enhancing measures were undertaken simultaneously by the Reserve Bank. All these measures made the banking system to park more than Rs.1,00,000 crore in the reverse repo window of LAF during 2009-10.

In deficit liquidity situation (June 2010–June 2012), the repo rate is considered as the policy rate and the same SVAR is applied with the above conditions. Here, the output was convergent. The graph above shows the impulse response of corporate bond yield to shock in the repo rate. It indicates that there is monetary policy transmission to corporate bond market when the system was in deficit mode.

Risk Pricing in Corporate Bond Market of India

To examine the risk pricing capacity of one financial market instrument, it is compared with another risk free instrument. Sovereign securities are always considered risk free. In Indian Government securities market, 10 year Government security (Gsec) is most liquid. However, it is not comparable with the most liquid corporate bond (AAA rated 5 year corporate bond). The other Government security having liquidity is 5year Gsec. Thus, the exercise is undertaken with 5 year G-sec yield and AAA 5 year corporate bond yield.

Generally the risk pricing in financial markets is analysed through ARCH-M methodology. In this study, the risk premium (spread) is arrived at by subtracting the daily yield of 5-year-G-sec from AAA-rated-5 year corporate bond yield. During January 2007-June 2012, this risk-premium is found to be non-stationary. However, this risk premium is found to be stationary in the post-crisis period, *i.e.*, October 2009 (when RBI started winding up the crisis related measures) to June 2012.

For identifying the suitable ARMA model for the mean of the premium (spread) variable, the autocorrelation function (ACF) and partial autocorrelation function (PACF) are examined. While the PACF declined sharply after the first lag, ACF declined slowly. This indicates that conditional mean of the premium (spread) could be characterised with first order auto regressive AR (1) model.

Initially, ARMA (1,0) model was estimated, and the residuals generated from it passed through the ARCH LM test. Then various types of GARCH models are applied to the daily data of risk premium (spread) for the period October 2009 to June 2012. After the AR (1)-GARCHM (1,1) is applied, the residuals were still associated with ARCH effect. But when AR (2) term is included, the residual ARCH effect disappeared. Different types of GARCHM (1,1) are applied, and the results are given in the table no.11.

The premium (spread) of corporate bond yield over G-sec is consistent with AR (2)-GARCHM (1,1), with standard deviation in the mean equation. The risk of corporate bond has positive effect on the premium (spread) as coefficient of the standard deviation term is found to be statistically significant (at 10 per cent level of significance) in the mean equation. The intercept coefficient estimated at 1.17 in the mean equation is statistically significant, showing the extent to which the corporate bond yield could deviate from the G-sec yield on average in the medium term. When variance in logarithm form is used in mean equation, it is also found to be having a positive effect, again confirming the above finding, though the size of its coefficients is extremely small (around 0.003). Overall, this application shows that the corporate bond market of India has started pricing the risks associated with it.

Finally, ARCH-LM test is conducted; no residual ARCH effect is found. The corporate bond market exhibited volatility persistence since the sum of ARCH and GARCH coefficients is close to unity.

The above result indicates that the corporate bond market in India is capable of pricing the risks associated with it. This finding is in contrast with the finding of an earlier paper on the subject (Mishra and Dhal, 2009). It may be added that the sampling frequency affects the results (Engle and Patton, 2001). Here the results have been obtained with the use of daily data, while the earlier study is based on monthly data. Further, the yield rates of 10 year government securities and 10 year AAA corporate bond are used in that study.

Table 11: Corporate Bond Yield spread

Items	AR(2)-GARCH		AR(2)-GARCHM^		AR(2)- GARCHM$	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Mean Equation						
Intercept	0.99	0.0	1.17	0.0	1.27	0.0
AR(1)	0.75	0.0	0.77	0.0	0.77	0.0
AR(2)	0.22	0.0	0.20	0.0	0.20	0.0
ARCH-M			0.04	0.08	0.0034	0.0
Variance Equation						
Intercept	0.0001	0.0	0.0001	0.03	0.0001	0.03
ARCH(1)	0.07	0.0	0.10	0.004	0.105	0.003
GARCH(1)	0.89	0.0	0.86	0.0	0.854	0.0
R^2	0.896		0.90		0.90	
LL	1054.7		1071.5		1072.6	
DW	1.97		2.03		2.02	
AIC	-3.24		-3.28		-3.29	
SIC	-3.20		-3.23		-3.23	

Note: ^ and $ refer to ARCH-M terms in the form of GARCH standard deviation and GARCH variance in logarithm form respectively.

Volatility Spill-over in India's Corporate Bond Market

Volatility spill over occurs when markets get integrated with each other. The limit on the FII investment in corporate bonds of India has been increased at regular interval. The behaviour of FIIs depends on the financial market conditions in different jurisdictions. Further, the partial capital account convertibility has allowed the Indian residents to take advantage from the movement in markets in different jurisdictions, and switch from one to the other. The behaviour of both the residents and FIIs can make volatility in one market to spill over to the other one.

To study the volatility spill-over to India's corporate bond market from overseas, the secondary market yield of generic AAA-rated-five-year corporate bond of India, Moody's yield of AAA corporate bond of USA are taken (in case of USA the corporate bond yield data is not easily available, the Moody's AAA-rated corporate bond yield is easily available and published by Federal Reserve Bank of St. Louis. The Moody's corporate bond yield takes all corporate bonds having more than 20 years residual maturity, and it is seasonalised). Weekly data is taken to avoid the fact that the closing day of one market may coincide with the trading day of the other market. This is the approach that has been followed in many earlier studies on this aspect (Karunayake 2009). Then first difference of the yields is calculated. The ADF test rejected the presence of unit root in the first differences. The Ljung-Box test of the first difference series shows the presence of serial correlation.

Then multivariate GARCH (diagonal VECH (1,1)) methodology is applied to the first difference data and the result from it is given in table 12. The results show that own mean spill-over is occurring in case of India.

The presence of ARCH effect indicates that the volatility shocks are significant in India. This means that past shocks arising from Indian corporate bond market does have impact on India's future corporate bond market volatility. There is no volatility shock coming from USA. The estimated coefficient of variance covariance matrix shows that co-efficient of the lag conditional variance is statistically significant in case of India, highlighting the presence of volatility persistence. This phenomenon is also seen in case of USA. The sum of ARCH and GARCH coefficients (aii+bii) is nearly equal to 1, and it indicates the volatility persistence in the two corporate bond markets. Overall, it shows that the secondary corporate bond market of India does not get volatility spill-over from the corporate bond market of USA.

To test for the serial correlation left in the system residuals, Portmanteau Box-Pierce test is conducted using Cholesky of covariance Orthogonization method. The result indicates that the null hypothesis of no autocorrelation cannot be rejected. It means presence of the serial correlation have disappeared.

The mean equations of the change in yield used for the estimation are given below, and these include terms up to three lag as serial correlation is found from the Ljung-Box test.

Mean Equations put in a simple form

$$INDIA = \mu_{01}+p_1*INDIA(-1)+q_1*USA(-1)+r_1*INDIA(-2)+s_1 *USA(-2)+ t_1* INDIA(-3)+v_1*USA(-3) \quad (12)$$

$$USA =\mu_{02} +p_2*INDIA(-1)+q_2*USA(-1)+r_2 *INDIA(-2)+s_2*USA(-2)+ t_2* INDIA(-3)+v_2*USA(-3) \quad (13)$$

Diagonal VECH (1,1) Equation is given by

$$vech\ (H_t) = C + Avech\ (\varepsilon_{t-1}\acute{\varepsilon}_{t-1}) + Bvech\ (H_{t-1}) \quad (14)$$

Table 12:Results from Diagonal VECH (1, 1) Estimation

Parameter	**INDIA**		**USA**	
	Coefficients	p-value	Coefficients	p-value
μ_{0i}	0.008	0.09	-0.004	0.42
INDIA(lag 1)	0.30	0.0	0.119	0.00
INDIA (lag2)	-0.029	0.67	0.031	0.48
INDIA(Lag3)	0.065	0.27	-0.08	0.09
USA(lag 1)	0.042	0.35	0.031	0.62
USA(Lag 2)	-0.051	0.31	-0.007	0.91
USA(lag 3)	0.0003	0.99	-0.018	0.78
C_{i1}	0.0015	0.001		
C_{i2}	0.0012	0.09	0.00	0.36
a_{i1}	0.463	0.00		
a_{i2}	-0.034	0.83	0.08	0.17
b_{i1}	0.499	0.00		
b_{i2}	0.169	0.78	0.85	0.00
aii+bii	0.96		0.94	
Ri^2	0.18		0.08	

Note: i=1 for India and i=2 for USA.

Section VIII

Conclusion

The study has analysed the various stages of the development of corporate bond market in India in detail, with a cross-country comparison. This study has found that the corporate bond market of India is not deep. In Indian context, a combination of factors such as procedural hassles, legal issues, and preference of the corporates for private placement in issuance is not helping the cause of the corporate bond market. Finding ways to make public offerings more attractive will help to bring in the retail investors, and address the liquidity problem in the secondary market of this segment.

The preliminary empirical analysis of the study reveals that the corporate bond yield is positively correlated with the call rate (weighted average call rate) and Government securities yield. However, corporate bond yield is negatively correlated with equity return (BSE sensex). Furthermore, the causality analysis shows that there is bidirectional causality among the Government securities yield and corporate bond yield. However, a unidirectional causality is found from Call rate, Exchange rate and Inflation rate to corporate bond yield. In the next stage, empirical analysis has used the GARCHM (1,1) methodology, and has revealed that that the Indian corporate bond market has the capacity to price the risks associated with it. Further, the SVAR application found that, in deficit liquidity conditions, the monetary policy transmission is pronounced in this segment. Finally, the VECH (1,1) model application shows that this segment of Indian financial market is not integrated with the overseas ones. Keeping in view lack of availability of research, this study is an attempt to open further areas of research on this market. It may be added that any work taking the yield of individual corporate bond, would be highly helpful in taking the research on this area to higher level.

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