New Thinking on Corporate Bond Market in India

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1. Executive Summary

In this paper, we examine the factors behind underdevelopment of corporate bond market in India. We assess that one of the major bottlenecks to the development of this market lies in relatively larger costs of financing which dissuade the firms to raise finance from this avenue. We argue that the lack of transparency, inefficient market making and illiquidity of the instrument not only lead to such extra costs of financing that hampers investment in the real sector but can trap the bond market in a low level equilibrium.

To alleviate such problems, we prescribe policies that ensure better production of information and increased volume of transactions that will lessen both liquidity and transparency problems and ensure efficient market making. A combination of such policies include mandatory disclosure of ratings by firms and assignment of multiple agencies for rating an issue at different points of time, minimum size of placements of (infrastructure) bonds, establishing stop loss threshold, among others will help breaking the trap and improve quality of issues and would eventually lead to a vibrant bond market with reduced costs of financing investment.

2. Structure of the Paper

The paper is structured in three parts. The first part, section 3 and 4 analyse how corporations finance themselves and how does the corporate bond market contribute in this process. Section 3 delves into how large Indian firms evolved in their financing pattern over the past decade. We further analyse what are some of the key drivers of such financing pattern when it comes to corporate bond markets in section 4.

In section 5, we offer an analytical construct and mode that shows how liquidity, transparency and informational problems contribute not only to higher costs of financing but may create low level equilibrium trap in the bond market where few issuers, investors and market makers participate.

In section 6, we summarise the policy implications of our findings and analyse what it would take for the corporate bond market to move from the current state (of low level equilibrium) to a higher level equilibrium. We examine where the policy maker might have a role to play and where the market will respond to address its concerns spontaneously.

3. A Review of how Large Firms in India Finance Themselves

Our analysis about the debt market in India begins with a review about how firms in India finance themselves. Our information is necessarily restricted to the largest firms of India, those that are observed in the CMIE database. We focus on non-financial firms, so as to avoid the measurement problems of accounting data for financial firms.

The `sources and uses of funds' statement, which is the first difference of the balance sheet, yields important insights into the financing structure.

Table 1: Structure of sources and uses of funds

	Ended	Ended
Component	2000-01	2010-11
Internal	**35.2**	**30.8**
Retained Earnings	5.7	21.1
Depreciation	29.5	9.7
External	**64.6**	**67.5**
New equity	17.2	13.8
Banks	14.4	17.8
Bonds	3.5	3.9
Foreign	0.5	3.2
Current liabilities	25.5	24.2

Table 1 shows the structure of the sources of funds, comparing the latest available year (2010-11) against one decade ago (2000-01).

The first feature of interest is internal financing. We see a substantial reliance on internal financing: from 35.2% a decade ago to 30.8% today. To the extent that internal financing is important, it acts as a barrier against new firms who do not have pre-existing cash-flow. The hallmark of a sophisticated financial system is a substantial extent of external financing. From a normative point of view, to the extent that external financing is greater, this is likely to induce superior resource allocation and competitiveness.

Turning to external financing, one important component – equity financing which was at 17.2% in 2000-01 and 13.8% in 2010-11 – is in relatively sound shape. The Indian equity market was the focus of policy makers from 1992 onwards, and substantial progress has been made. One key element – stock lending – is as yet absent. Barring this, all sophisticated features of the worlds top equity markets are now found in India. The two Indian exchanges, NSE and BSE, rank 3rd and 5th in the global ranking by number of transactions, that is produced by the World Federation of Exchanges (WFE).

The problems in India today lie in debt. Banks accounted for 14.4% of the financing of large firms in 2000-01, which went up to 17.8% in 2010-11. The bond market stagnated, with 3.5% in 2000-01 and 3.9% a decade later. Despite considerable interest in bond market development, the corporate bond market accounted for only 3.9% of the sources of funds of large Indian companies. Finally, foreign borrowing rose sharply, from roughly nothing in 2000-01 to 3.2% in 2010-11. To some extent, borrowing abroad has served as a way for Indian firms to overcome the difficulties of obtaining debt financing domestically.

From a normative perspective, the picture that we see in the sources of funds is one of an excessive reliance on internal financing, a surprisingly large role for banks, and a miniscule and stagnant bond market.

The next issue that we turn to is the role of secured versus unsecured borrowing. The hallmark of a sophisticated debt market is the presence of unsecured borrowing. Secured borrowing is the mainstay of a simple-minded financial system:

The lender does not have to analyse the prospects of the borrower for he lends only against collateral. In contrast, unsecured borrowing requires that the lender has to understand the prospective cashflow of the borrower, which determines the extent to which the promises about future repayment may be upheld.

We analyse secured versus unsecured borrowing by size quintiles, once again amongst all the non-financial firms seen in the CMIE database. In the smallest quintile, in 2001, secured borrowings were at 76.7%. A decade later, there was a small decline, to 65.37%. This shows the stubborn domination of secured borrowing, when it comes to the smallest firms. Similar patterns are found in other size quintiles also. In the *fourth* quintile – from the 60th percentile to the 80th percentile – secured borrowing was 84.7% in 2001 and had dropped slightly to 80% in 2011. This domination of secured borrowing suggests a debt market that has a highly limited ability (or incentive) to actually understand borrowers.

Even in the top quintile of firms – roughly the 680 biggest companies of India – we do not see a meaningful extent of unsecured borrowing. In 2001, secured borrowing was 65.8%, and this dropped to 60.7% in 2011. In other words, even for the biggest firms of India, only 39% of borrowing was unsecured. The debt market was not able to analyse the prospects and give debt, based on assessment about the future, to a substantial extent to even the biggest firms in the country.

This evidence shows a highly malformed debt market. The bond market is practically non-existent in corporate financing. Forward-looking assessment is weak; even the biggest firms tend to rely on secured borrowing.

4. Key Issues with Indian Corporate Bond Market Functioning

The presence of corporate bond market in India is barely perceptible as compared to other economies. Despite of multiple endeavours by the government in the recent past, to revive the market, neither investors nor issuers showed any tangible interest. As a result, at least 80% of corporate bonds comprise of privately placed debt by public financial institutions. The following graph confirms inadequate growth of the bond market in India relative to the countries like US, Japan and China.
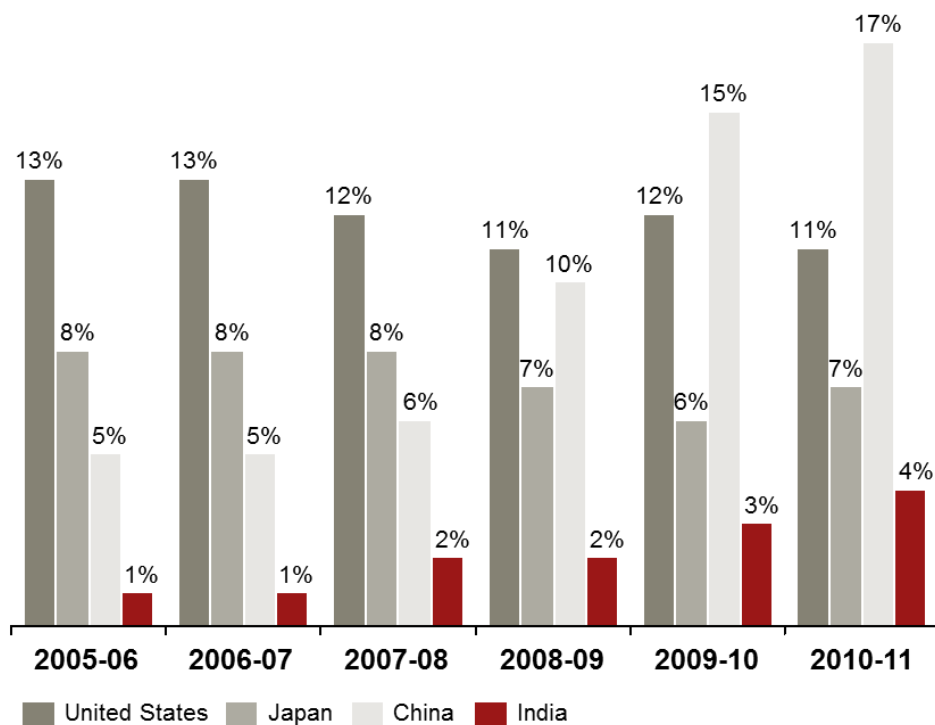
Illustration – Share of Corporate Bonds in Total Debt (Source: BIS)

Bond markets as well as equity market owe their difference to inherent characteristics of the instrument that underlies respective markets. The following summarise how the markets are different –*Intermediaries* – Market intermediaries in both bond and equity markets ensure liquidity. However the intermediaries in the bond market at present need to hold a larger amount of capital than their counterparts in the equity markets because of the larger volume of trade in each transaction. Subsequently the need to hold large inventory position is more for bond market intermediaries as compared to equity market intermediaries who have the option to do electronic limit order matching. Hence, intermediaries in the bond market are exposed to greater risks due to liquidity partly due to the absence of a secondary market where retail investors can participate along with large players.

Investors – Bonds' payoff are attractive to those who prefer predictable returns for known time horizons. As a result, bond market attracts institutional investors cautious of protecting their principal e.g. pension funds, insurers, banks, etc. This also results in relatively risk averse retail investors willing to invest in the bond market. However, casual empirical observations suggest that the share of retail investors in corporate bond market is very small. Lack of liquidity and transparency are the key reasons driving lack of investor participation in corporate bond market including retail investors.

Another reason why the market for corporate bonds did not take off earlier was large scale default that undermined the system and safeguards in place. While this paper addresses how to alleviate problems of liquidity and transparency, other measures must also be adopted to reduce probability of default and increase the amount as well as speed of recovery in the event of bankruptcy. For example, it is well known that firms have a tendency to adopt excessive risky projects financed by debt due to limited liabilities. While banks can prevent such activities by placing covenants, public debt holders are powerless to do it because each owns an

insignificant amount of the total debt. Many a times, the seniority of debt is debatable. On the other hand, the magnitude of the recoveries also depends on bankruptcy law which in India is very weak. Hence, strong legal systems that prevent excessively risky activities and also ensure faster resolution of bankruptcy are also preconditions for the emergence of a strong bond market.

Though there might be a combination of factors that impede the growth of a vibrant corporate bond market in India, we will argue below that the lack of transparency, less liquidity and inefficient intermediation in the process of market making contribute to the current state of the market. The bullet points below succinctly summarize the impact of these three factors on the development of bond market in India.

- Efficiency in bond market is driven by transparency that allows bonds to be priced for all available information. Transparency in the bond market refers to the
  dissemination of information conveyed to all market participants [1] regarding pre and post trade issues ranging from order interests to price and volume after trade is executed.
- Liquidity in bond market is driven by volume of bonds offered by issuers in the primary market on an on-going basis as well as the circulation of bonds in the secondary market with active investor participation. A greater the participation of investors reduces search costs of both buyers and sellers and ease liquidity problems leading to a lower discount of the bond. Liquidity problems here refer to the ease of selling the bond in a secondary market.
- Intermediaries quote both buy and sell side prices and hold inventory to enable market making. Any inefficiency in this process will be automatically reflected in the pricing of bonds and thus will adversely affect costs of borrowing of the issuers.

4.1 Transparency

The Indian corporate bond market lacks both pre-trade as well as post-trade transparency. Factors limiting transparency of both primary and secondary corporate bond market are:

(a) Systemic flaws in the credit rating process by the Credit Rating Agencies (CRAs) enhance risk and also reduce transparency due to a constellation of a number of factors articulated below:

 Right to rate the issuers of bond is not confined to entities registered as CRAs (Credit rating agencies) and currently ratings are being done by entities not registered as CRAs. These unregistered agencies rate in a manner that is not calibrated to CRA rating standards and offer rating to not just instruments but also issuing organisations. This infuses additional noise in the production of information which may force retail investors to shy away from the bond market. For example, the SMERA which rate instruments as well as organisations for small and medium industries in a manner that very often do not meet criteria of proper rating standards.

 Issuers can shop for credit rating which makes identification of risks quite difficult. If an issuer may choose not to accept the rating in the event of disagreement and the rating then goes unpublished. A mandatory disclosure may stop such opportunistic shopping for ratings.

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[1] See Bessembinder and Maxwell (2008)

Lack of regulatory mandate on monitoring norms of CRAs can potentially lead to conflict of interest and hence create further gap in the information asymmetry between issuers and investors. For example, CRAs are mandated to track and continuously monitor their ratings till the time of maturity of an instrument. This calls for an independent credit monitoring team in the subsequent period which ought to be different from the initial rating team. While some CRAs in India incorporate such process, corporate governance norms for CRAs do not mandate credit monitoring and issuing functions to be independent as in banks.

(b) With bulk of the corporate bonds being placed privately, the population of investors observing ex-ante quotes is less than 49. This further impacts transparency not just in primary market at the time issuance but also subsequently in the secondary market. This also pre-empts investors with better offer from stepping-in.

4.2 Liquidity

Absence of a liquid corporate bond market acts as a key deterrent for investors to participate. Liquidity of corporate bonds is not just driven by demand and supply but also by transparent pricing observable by investors.
Factors impacting corporate bond market liquidity are –

(a) Limited issuer and investor base - bulk of bond issuers in the corporate bond market consists of banks and financial institutions. With more than 98% of bond placements being private, availability of bonds for trading in secondary market is pre-empted by a handful of investors and limits price discovery in the secondary market

(b) The corporate bond market in India lack a benchmark yield curve across maturities and hence pricing in the secondary market is not observable across all maturities which has a first order impact on liquidity. Preference for long term bonds (>10 years maturity) by trusted issuers like Banks hinder development of benchmark yield curve across maturities. This makes spread determination for non-banking entities (PSUs, corporates, SMEs, etc) for lower maturity bonds difficult to observe.

(c) Investor profile and market regulation further limits secondary market liquidity. With key investors like insurance companies preferring to hold till maturity and lack of activity from pension funds and FIIs in corporate bond market owing to policy limitation, only mutual funds and Banks are left to trade and offer volume in the secondary market.

(d) In addition, lack of quality bond papers in the market reduces the buoyancy of the corporate bond market.

4.3 Market Making

Despite of several initiatives over the past one decade, market making has been difficult to implement. The following points illustrate the problems in somewhat details.

(a) Lack of competitive, capable and capitalized intermediaries as market maker
Currently banks and FIs dominate the market for arrangers. However as they lend money through banking channels, their appetite for market risk is limited as compared to credit risk.
Very few NBFCs / Brokers are arrangers owing to lack of funds and low appetite for market risk.

(b) To minimize underwriting risk, arrangers prefer highly rated corporate bonds. This makes access to market arduous for those who are not highly rated e.g. SMEs or not highly rated corporate bonds.

5. Why Debt Matters in Corporate Finance: An Analytical Perspective

The discussion in the previous section had addressed the issues related to the meagre existence of the corporate debt market in India. Lack of such market might lead to excessive risks by the firm as their wealth are tied up in a single project. In addition, lack of alternative markets also lead to poor screening of projects for allocating credit. In any case, the small and medium size firms tend to suffer as they are financially constrained as a consequence.

However, there already exists a well functioning equity market in India and the absence of a market does not necessarily justify its creation of the market unless the gains to all participants exceed the costs. Although it is a very complex theme, to narrow down our focus, in the current section, we address the following questions in detail:

1. Why or under what scenario, the debt as an instrument is superior to equity from the standpoint of the issuer? That is, under what conditions, issuers of financial instruments will find the market for corporate debt as a less costly avenue for raining finance than its alternatives?
2. If there is a strong case for opening of such market, how it should be designed to minimize operational costs and to ensure optimum level of participation of both investors and issuers?

The first question is related to arguments based on academic studies which go beyond Modigliani and Miller paradigm to explain gains and costs of alternative finance markets to issuers. The second question addresses how a bond market, if initiated, need to be designed so that it operates in the most efficient manner. That is, what components must be in place so that it accomplishes minimum costs for completing transactions that include registration, underwriting, secondary market trading to settlement of payments. We will take up these issues in detail in this and next section.

5.1 Why debt market?

Once one departs from a perfect world of frictionless arbitrage in the financial market between risky assets, various types imperfections tend to impart a bias in favour of class of financial instrument which yield least cost to issuer, as opposed to its alternatives. Though in reality, there are multitude sources that give rise to frictions, we will deliberately emphasize various types of information frictions that tend to create biases towards selective methods of financing.[2]

Of course, imperfections in information can stem from a number of sources and one can list them as follows:

1. *Moral hazard* of the entrepreneur whereby the outside investor cannot observe the choice of effort of an entrepreneur.

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[2] See Tirole (2006) for a discussion on these issues.

2. *Adverse Selection* where the investors cannot observe types of the entrepreneurs. An entrepreneur can be efficient or inefficient and he has the full knowledge but outside investors knows only the proportions of these two types, but does not know whether a particular financial security is issued by the efficient or inefficient type.
3. *Costly state verification* where outside financiers cannot observe the final cash flow without resorting to mechanism of audit or verifications of some other sort.

The optimal financial security that stands to emerge in all these cases of information asymmetry is debt financing. For example, if investors and entrepreneurs are risk neutral and the latter is protected by the limited liability, debt is the optimal security because it preserves the incentives of the entrepreneur and prevents the destruction of output as a bid to hide information. The intuition behind the result is that debt, being a fixed payment by an entrepreneur to investors, prompts the entrepreneur to exert maximum effort, resulting in the creation of value and reduces the probability of bankruptcy. The issuance of equity, on the other hand, directly interferes with the provision of incentives because an entrepreneur has to share every additional output with outside investors and thus reduces his incentives to make the project successful. See Innes (1990).

The case where auditing or verifications are non random, debt also stands out to be the least cost method of financing (under costly state verifications) because it minimizes the audit cost borne out by investors. Once they are paid the face value, they need not resort to any auditing mechanism. The optimal contract stipulates a payment (face value of debt) and a threshold value of output (payment) below which the investor will resort to audit of actual production of output.

5.2 Adverse selection

Debt like securities could be an optimal response to adverse selection problems where investors confront firms with unknown qualities. We will discuss a simple model of adverse selection discussed in Tirole (2006) to highlight debt as an optimal security when there is asymmetry of information between firms and its financiers.

To capture the problem of adverse selection in the simplest form, we assume that there are two types of firms and each owns a project that requires an investment of I. The firms which are **good** tend to manage the project more efficiently which reduces the risk of the project. The project has uncertain outcome and if the firm is good, then the probability of a high outcome (Y_h) is p, so that $1 - p$ is the probability of a low outcome (Y_l). On the other hand, there are mediocre or inefficient firms for which the probability of a high outcome is q where $p > q$. We will often denote Y_h as a ''success'' and describe Y_f as a ''failure'' event. Furthermore, we assume that for the economy as a whole, the fraction of good and efficient firm is μ and the remainder $1 - \mu$, is the proportion of inefficient firms. The investors know that there are good and mediocre firms in the economy. In addition, they also know the relative fraction of such firms and the corresponding probabilities for successes of each. But they lack information for a specific firm in the sense that they do not know whether a financial security is issued by a good or mediocre quality firms. The following table summarizes the structure:

The firm needs financing from outside in order to finance investment (I) for the project and we assume that $Y_h > I > Y_l$ so that the state Y_l is a state of

bankruptcy where investors will not be able to get back the total fund (I) that they had invested in a firm.

Cash flows/output	Probability (efficient firms) (Fraction μ)	Probability (In efficient firms) (Fraction $1 - \mu$)	Payments to Investors
Y_h	P	q	Z_h
Y_l	1-p	1-q	Z_l

If the firm promises to pay Z_h and Z_l to investors, when the cash flow realized is Y_h and Y_l respectively, then the break even condition for the investors is:

$$\mu p + \ 1 - \mu \ q \ Z_h + \ \mu(1-p) + \ 1 - \mu \ (1-q) \ Z_l = I \qquad (1)$$

The left hand side of the equation is the expected payments to investors because an she receives Z_h if the cash flow of the project is high but does not know whether the firm in question is efficient or not. The probability that it belongs to an efficient (good) group is μ and in that case the probability of success is p. Or it could be an inefficient (bad) firm with a probability of $1 - \mu$. In that case, the probability of a high cash flow is q. Hence, $\mu p + \ 1 - \mu \ q$ is the probability that an investor may receive Z_h, which is promised when the realized cash flow is Y_h. In the same manner, $\mu(1-p) + \ 1 - \mu \ (1-q)$ is the probability of receiving Z_l. On the other hand, right hand side is what investors get from investment of the same fund (I) outside with a zero rate of return.

Now, a good firm's expected pay-off is : $p(Y_h - Z_h) + \ 1 - p \ (Y_l - Z_l) \qquad (2)$

Where Z_h and Z_l must satisfy the zero profit constraint (1).

Now, let us consider the following variation in payments whereby the payments in the high state to investors is reduced from Z_h to $(Z_h - \epsilon_1)$, while the payments in the low state is increased from (Z_l) to such that zero profit constraint holds so that investors receive the same pay-offs. That is, $\mu p + \ 1 - \mu \ q \ (Z_h - \epsilon_1) + \mu(1-p) + \ 1 - \mu \ (1-q) \ (Z_l + \epsilon_2) = I$, so that $\mu p + \ 1 - \mu \ q \ \epsilon_1 = \ \mu(1-p) + \ 1 - \mu \ (1-q) \ \epsilon_2$

That is, investors' zero profit or break even constraint gets satisfied. However, this variation will alter both type of firm's expected profit and the efficient type of firm's perturbed pay-off is written below:

$= p(Y_h - Z_h + \epsilon_1) + \ 1 - p \ (Y_l - Z_l - \epsilon_2)$
$= p(Y_h - Z_h) + \ 1 - p \ (Y_l - Z_l) - p\epsilon_1 + (1 - p)\epsilon_2$
Using $\epsilon_2 = \frac{\mu p + \ 1 - \mu \ q \ \epsilon_1}{\mu(1-p) + \ 1 - \mu \ (1-q)}$ in the above expression, we get
$= p(Y_h - Z_h) + \ 1 - p \ (Y_l - Z_l) + \frac{1 - \mu \ (p-q) \ \epsilon_1}{\mu(1-p) + \ 1 - \mu \ (1-q)} \qquad (3)$

Comparing equations (2) and (3), we find a reshuffling of payment away from the state where the project is more successful to the state where cash flows are smaller, the more efficient firm increases their expected pay-off. Since such a reallocation of payments always increases the firm's pay-off, her pay-off is maximum when $Z_l = Y_l$, i.e, the firm pledges the whole cash flow in the bad state to investors so that payment in the good state (D) is chosen to satisfy the zero profit constraint of the investor, which implies that

$\mu p + (1 - \mu) q \, D* + \mu(1 - p) + (1 - \mu)(1 - q) \, Y_l = I$. Thus the payment resembles debt financing where lenders receive everything in the bad state and gets a constant payment in the good state.

The intuition for the result is this: From the zero profit constraint, one can see that the trade-off between good and bad states income of the investor is: $\frac{dZ_l}{dZ_h} = -\frac{\mu p + (1 - \mu) q}{\mu(1 - p) + (1 - \mu)(1 - q)}$, which states how much the investors want the firm to increase the payment in the ''low'' state for a one unit decrease in the high state. On the other hand, if a firm is good, it is capable of giving up higher amount in the low state for a 1 unit sacrifice for income in high state because for a good firm $\frac{dZ_l}{dZ_h} = -\frac{p}{1-p}$ because $p > \mu p + (1 - \mu) q$ bcause by the law of average the higher value (p) must exceed the wighted average value of p and q.

Intuitively, any security that pays most in the lower state is preferable for a good firm because asymmetric information hurts them most because good (p) is treated as ''average'' $(\mu p + (1 - \mu) q)$. Hence, by pledging everything in the lowest state with a priority to investors could minimize costs of financing. And any security with a maximum pledgible amount in the lowest state is either debt or a debt like security.

Discussion: Although we presented a selective survey of the literature on optimal financing under asymmetric information to emphasize the issuance of debt as an optimal security from the viewpoint of its issuer but there are other cases where it may not be the optimal financial instrument. For example, debt exacerbates another type of moral hazard problem where an entrepreneur can deliberate choose a riskier project which has a higher upside potential but the expected value of the overall project is lower. Since the entrepreneur does not receive anything if the project fails and gets the whole surplus in the event it succeeds, debt financing typically worsens the incentive problem involved in the choice of projects and equity or equity like instruments fare better in this type of situations.

However, debt financing can be optimal whenever a firm need to signal to outside investors about the likelihood of its bankruptcy. A firm with a lower probability of bankruptcy can separate itself from similar firms but with a higher chance of being bankrupt by issuing a sufficient amount of debt which will be avoided by the latter. See Ross (1979) on this point. The firms, with higher probability of default will avoid issuing such amount of debt as it would trigger bankruptcy and stand to lose out. In the end, it is the trade-off between improved value of security and bankruptcy cost that determines the optimal choice of debt.

To sum up, although there is no unifying theory of capital structure but in a large number of cases with specific types of asymmetric information, debt stands to fare better than alternative financing arrangements such as equity as it preserves incentives, ameliorates asymmetric information and minimizes audit costs and helps a firm signalling its inside worth.

One may also draw the inference that situations like these that make debt a favourable instrument for the issuers typically arise for small and medium firms.[3]

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[3] Though at the beginning of the paper, we reviewed the structure of financing of large firms, our analysis in the rest of the paper points out difficulties in obtaining finance of the firms that lack track record and likely to fall under he category of small and medium. Moreover, if the large firms encounter bottlenecks in raising finance, as pointed out in the beginning, one would imagine the problem to be severer for the smaller business units.

These firms most often lack track records or history or sufficient volume of information needed to get registered in the equity markets. Hence, the information asymmetry is most severe between small and medium and younger firms and investors and it makes the case for opening a market for debt for their benefit.

However, in practice, issuance of debt is elaborate and complicated processes that involve underwriting, rating and grades, dealership, liquidity in the secondary market, settlement of payments and a proper legal framework which oversees orderly proceedings during bankruptcy. Hence, although information asymmetry makes the argument for debt financing stronger but if the operational part and infrastructure are not efficient, small and medium firms may choose alternative source of financing.

For the rest of this section, we will argue with a simplistic framework that lack of proper functioning of the rating agencies and illiquidity in the secondary market due to high costs of participation of retail investors impose further costs and can lead to a low level trap where a bond market may fail to develop due to its inner weakness and only a proper and judicious reform can make the market vibrant.

5.3 Rating agencies

Typically, a firm contacts underwriters who along with interactions of institutional buyers and bond dealers try to form the primary market. After they buy the bonds, investors may have liquidity problems and may transact in the secondary market either by direct buying and selling or via selling and then buying back (repo) etc. . Finally, upon maturity, the firm pays the face value and interest rate if there is no default.

In carrying out these functions, rating agencies play a key role in reducing asymmetric information which help formation of both primary and secondary markets. These agencies primarily dig extra information about the bond issuers and communicate it to investors via their ratings. The most intuitive way of representing this processing of information is their learning of a signal, which can be either high or low. High signal (σ_h) implies that it is more likely that the firm belongs to the "good type" and a low signal (σ_l) indicates that the firm belongs to the bad type. Of course, an agency could make mistakes in the sense that it can receive a high signal for the bad one and low signal for the good one. However, if the signals are effective, then it means that probabilities of making such mistakes are lower. Thus signal itself is probabilistic and can be represented by :

$$Probability \ \left(\sigma_h \ | \ G\right) \ = Probability \ (\ \sigma_l \ | \ B \ = \lambda > \tfrac{1}{2}$$

The expression above suggests that if a firm receives a "high signal" (which could be earnings or sales in the consecutive quarters, strong balance sheet etc.), the news is more likely (probability is more than 50%) coming from a good quality firm. A firm that will have a cash flow of Y_h with a higher probability ($p > q$). On the other hand, if the rating agencies draw a "low signal" (σ_l) , it is very likely that the firm in question belongs to the bad type with a lower probability of high cash flow.

That is λ measures the precision of the signal, i.e. how close the estimate about the firm with their actual types. Suppose that the rating agencies have received a high signal. Then the probability of success (Y_h), given high signal is

$$P = \frac{\mu p \lambda + \ (1 - \mu) \ (1 - \lambda) q}{\mu \lambda + \ (1 - \mu) \ (1 - \lambda)}$$

Without rating agencies the estimated probability of success is $\mu p + 1 - \mu\ (1 - p)$.

If $\lambda = 1,$ then $P = \text{p}$, that is, rating agencies can convey the investors he probability of success with 100% precision so that both firm and investors have full knowledge and information about the firm. The precision is measured by the value of λ because $P - [\ \mu p + \ 1 - \mu\ \ 1 - p\ ] = . \frac{\mu\ 1 - \mu\ (2\lambda - 1)(p - q)}{\mu\lambda + \ 1 - \mu\ (1 - \lambda)} > 0$. If $2\lambda - 1 > 0$

Hence, if $2\lambda - 1 > 0,$ then a good signal implies that estimated actual probability of success (P) with extra information (which is the signal obtained by the RAs) exceeds the same without it. We will not delve into the structure of the rating industry and organization of individual units that are ultimately responsible for production of λ. But we will make some recommendations in the next section that help improved performance of the agencies, leading to a better resolution of asymmetry of information.

5.4 Liquidity

After buying a bond, an investor can have liquidity shock and may want to sell the bond or use it as collateral for borrowing funds. This could be with or without possibility of buying it back at a future date which gives rise to the repo market. The ease of selling the asset depends on (a) ratings of the bond (b) how many investors are willing to buy and sell bonds. Both depend on λ. That is, one may think about the secondary market as ''searches'' for potential trading partners. If someone wants to sell an asset, the probability of how quick one can sell the asset depends on how many buyers are there in the market. That is, the basic question is: how thick the market is and the answer depends on how informative the secondary market is and that in turn, depends on λ as well.

The greater the precision of $\lambda,$ (the more accurate rating agencies are), the higher is the probability of meeting a trade partner and the lower is the liquidity costs and lower would be the costs of financing.

5.5 A unified analysis of rating agencies and liquidity

Let N (normalized to unity) be the total number of investors and n be the number of investors who purchase the bond. Investors are heterogeneous and have differential costs of financing. This is intended to capture small (retail) and large investors (Banks, Pension funds etc) who participate in the financial markets and buy bonds.

Let $H\ r$ be the distribution of costs of financing defined on the interval $[\underline{r}, \overline{r}]$ with $h\ r\ = H^{/}\ r$. That is, $H\ r$ denote the proportion of individuals who incur costs of financing their purchase of asset less than r per cent. Hence, the number of investors participating in the market ($H\ r$ supply of fund) at a given cost of borrowing:

$$n = \ _{\underline{r}}^{r_i} h\ r\ dr$$

Let $1 - \alpha$ be the probability of a liquidity shock where the investor need to sell the bond at the price (B) in the secondary market to meet his cash obligations. The probability of meeting another investor will, in turn, depend on the ''thickness'' of the market in the sense how many retail and institutional investors are operating in the

market. For example, if many investors participate in the secondary market, it is easier for a seller to find a buyer. A buyer also on the other hand, has to spend resources and incur transaction costs to locate sellers. However, if sellers are numerous, the transaction costs are lower.

Hence, for the equilibrium to hold in the overall market, two conditions must hold: First, the investors must obtain zero profit in the primary market and the second, buyers in the secondary market also obtains zero profit.[4]

$$\alpha PD + (1 - \alpha)m(n)B = I(1 + r_i n) \qquad (4)$$

and $B = PD + c(n)B$ or $B = \dfrac{PD}{1 + c n} \qquad (5)$

$m(n) \equiv m\dfrac{(N-n+\alpha n)}{(1-\alpha)n}$ and $c(n) \equiv c\dfrac{(N-n+\alpha n)}{(1-\alpha)n}$ and $c^{/}(n) < 0$ and $m^{/}(n) < 0$

and $P = \mu p \lambda + (1 - \mu)(1 - \lambda)q$, depends on the effectiveness of the rating agencies via the impact of λ.

Solving these two equations, for a given n we get, the face value of debt:

$$D = \dfrac{I(1+r_i)}{P\left(\alpha + (1-\alpha)\dfrac{m(n)}{1+c n}\right)} \qquad (6)$$

The price in the secondary market:

$$B = \dfrac{I(1+r_i)}{P\{1+c n\}\left(\alpha + (1-\alpha)\dfrac{m(n)}{1+c n}\right)} \qquad (7)$$

For a given number of individuals, participating in the market (taken to be exogenous), the face value of debt is determined by the "marginal investor" (n*) who is making zero profit. Hence, those with borrowing costs less than r(n*) will make a positive profit. Now, if everyone expects that others will participate and $if\ G^{/}(n*) < 0$, so that costs at the margin is falling, everyone else will enter. The opposite will happen if $G^{/}(n*) > 0$. This will generate a new face value of debt and the secondary market price for the debt.

The entrepreneur or the issuer has a technology that converts a given amount of investment (capital stock because it depreciates after a period) to output and the technology is described by a concave production function, given by $Y = f(I)$. The production is still stochastic as before and has the probability of success is either p or q (as before) , depending on the type of issuer. Hence, the expected pay-off for an entrepreneur of a good type is:

$$p(F(I) - D) = pF(I) - I(1 + r_i(n*)) - I(1 + r_i(n*))\dfrac{p}{P}\left(\dfrac{1}{\alpha + (1-\alpha)\dfrac{m(n)}{1+c n}} - 1\right) \qquad (8)$$

The entrepreneur chooses investment (I) to maximize the expected profit given by (8) and the first-order condition:

$$pf^{/}(I) = \dfrac{p}{P}\dfrac{1+r_i}{\alpha + (1-\alpha)\dfrac{m(n)}{1+c n}} \equiv \dfrac{p}{P}\dfrac{1+r_i}{G(n)} \qquad (9)$$

While the left hand side is the marginal increment in the expected output of the good borrower/entrepreneur. The right hand side is the marginal cost of borrowing and has three components.

(a) $(1 + r_i)$ = costs of borrowing an extra amount of fund and is mostly related to fundamentals of the economy as well as macroeconomic policies. .

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[4] Alternatively, we could have introduced a bargaining in the secondary market between buyers and seller but would complicate the exposition without affecting the final results.

(b) $\frac{p}{P} = \frac{p}{\mu p \lambda + (1-\mu)(1-\lambda)q} > 1$ is due to information asymmetry (spread between p and P) and largely depends on the effectiveness of the ratings issued by the CRAs

(c) $G(n) = \frac{1}{\alpha + (1-\alpha)\frac{m(n)}{1+c(n)}} > 1$ is the cost of funding associated with problems liquidity of investors that has been discussed in detail. In a world without liquidity and information problem, the expected marginal productivity is equal to $1 + r_i$.

That is, investment in real activities are hampered not only by interest rate only but investors pay a premium over the borrowing rate due to liquidity and information issues which tend to reduce investment by increasing costs of borrowing at the margin, as expounded by the right hand side of the equation (9).

The following observations are in order:

1. To reduce the gap between $p \text{ and } P$, the government policies should address the information externalities and structure of competition in rating industries to ensure that socially optimal ratings are produced. A better signal from the rating industries will make P closer to p and will reduce the premium further and ease the costs of borrowing.
2. To maintain the interest rate (r_i) at a reasonable level, one need to have not only a sound monetary policy but also a broad market for borrowing with different maturities so that benchmark rates interest rate reflects the real cost of fund.
3. If $G'(n*) < 0$,[5] then there is a possibility of multiple equilibria as the demand for loans for business investment can be non monotonic with respect to the interest rate. This can be seen as follows: Direct differentiation of $r_i \text{ with}$ respect to I in the equation (9) yields:
   $\frac{dI}{dr_i} = \frac{G(n) - (1+r_i)G'(n*) h(r)}{f''(I) P G(n)^2}$. Since $f''(I) < 0$, the sign of the loan demand function (for investment) will depend $G(n) - (1+r_i)G'(n*) h(r)$ and the expression can be negative at a higher level of n when the latter term dominates. Intuitively, the reason for an upward sloping loan demand function is this: An increased rate of interest will increase costs of financing and thus lead to a fall in investment and thus a fall in the loan demand. This is the traditional channel through which the borrowing rate works. Then, an increased cost of borrowing will also lead to an entry of the retail borrowers into the market and their mass is determined by the density function $h(r)$. This will reduce the premium on the borrowing costs due to easing of the liquidity problems and would thus enable the borrowers with cheaper access to financing , which would spur investment and growth.
   Since the supply function of the loan is upward sloping, we can have multiple intersections as drawn in the diagram below, we may have multiple equilibria. [6]
4. A good reason for low level participation of the retail investors in the market can be caused by (not captured in the present model) due to private placement of debt in the primary market so that secondary market transactions take place only among the big players. It might make

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[5] The sign of $G'(n*)$ is proportional to $\frac{1+c(n*) m'(n*) - c'(n*) m(n*)}{1+c(n*)^2} > < 0 \text{ as } c'(n*) < 0 \text{ and } m'(n*) < 0$

[6] Basu (1986) also analyzes similar phenomena in the context of land market in India.

expectations of a thin market perpetuating and may sustain the low level equilibria.
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5.6 Theoretical model – Results and Implications

The upshot of the discussion is that information problem and liquidity issues need a careful look from the view point of policy makers. They must address the problems of regulations regarding structure of rating agencies for the production of socially optimal level of information and need to impose rules on the private placement of debt in the secondary market with an eye to break low level equilibria (if it exists) with due attention to the possible costs that might accompany.

Transforming the corporate bond market requires us to take a holistic view across the three key levers that drive market inadequacy today i.e. transparency, liquidity and market making. Addressing policies to individual lever will result in a blinkered approach as these levers are interrelated and influence each other. Consider the following situations as example –

(a) Transparency while reducing adverse selection through better signalling may influence liquidity adversely especially in a market with smaller number of participants as inventory position of the intermediaries are known to the investors. This results in bargaining power skewing in favour of buy-side for an intermediary who is holding a large inventory of corporate debt securities. Thus transparency should be addressed concurrently while establishing a broader market base (investors, issuers and intermediaries)

(b) Every market participant including intermediaries seeks reward for the cost they incur and the risk they undertake. For intermediaries, the key risk they undertake is holding of inventory position and the market risk associated with it driven by lack of pre-trade transparency. This reward is reflected as a fixed cost in the price they quote and in turn impact cost of funds. Thus to minimize impact on cost of funds any encouragement to market makers should be complemented by improvement of systems and processes that improve pre-trade transparency and reduce rent seeking behaviour on part of market makers.

Our analysis clearly points out to the directions regarding the creation of a bond market infrastructure. The policy has to be two pronged –

The first, creation of new institutions and/or transform how existing institutions function to ensure quality. This will ensure transparency leading to clear and transparent signals on the production of information as well as effective market making.

The second, to break the low level equilibria, the policy makers must apply quantum forces to break the vicious circle of low level participation and poor liquidity. Hence, a combination of quality augmenting institutions together with big push can lead to a vibrant bond market and in the next section, we outline policies which will push towards the desired directions.

Figure: Multiple Equilibria dynamics
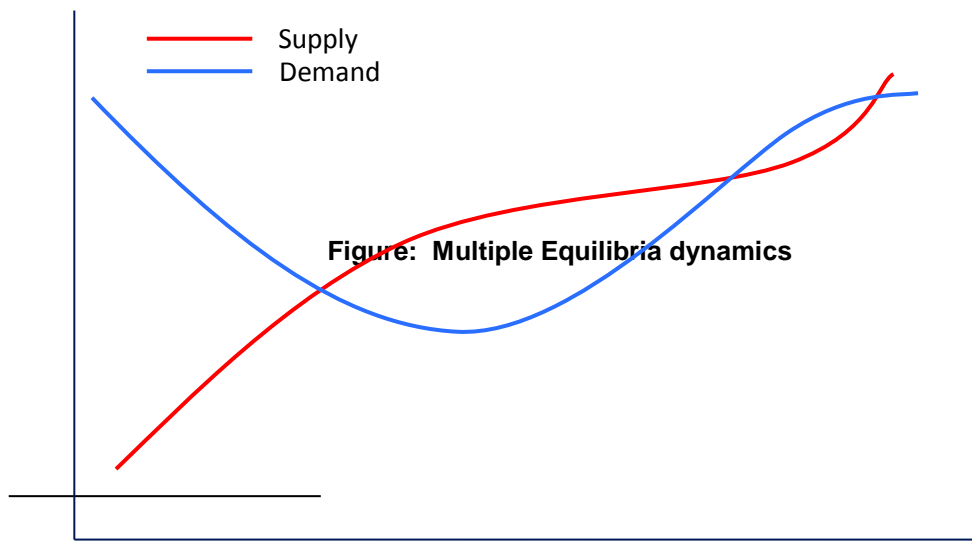
6. Policy Recommendations

6.1 Ensuring quality through institutional architecture

Optimal institutional architecture needs to reconcile business interests of every market participants – demand side, supply side and intermediaries. The policy recommendations focus on designing a self-sustaining ecosystem for investors, issuers and market makers.

(a) Transform Credit Rating Agencies and the credit rating process towards ensuring greater transparency -
   i. All entities offering credit rating as a service must be registered as a credit rating agency
   ii. Entities not registered as CRA should not be allowed to 'rate organisations' in a manner that is not calibrated to CRAs rating process for instruments issued by such organizations
   iii. CRAs should not be allowed to carry out businesses like consulting on instrument design, etc even by an independent arm
   iv. Transform corporate governance norms for CRAs
      • Function responsible for assigning initial credit rating and function responsible for subsequent monitoring should be mandatorily separate (akin to credit and risk functions of the bank)
      • SEBI to conduct operations and process compliance audit of CRAs
   v. All credit ratings once obtained must be compulsorily published by the enterprise who is the issuer and have purchased the service
(b) Improve reliability of benchmark yield curve – Encourage trusted issuers like banks/FIs to issue bonds across maturities. Towards this, public sector banks and PSUs should raise atleast 50% of their >3 years maturity bond requirements from public issue
(c) To encourage SMEs to issue bonds and raise funds from the debt market –
   i. Offer special Repo window to market makers dealing with SME bonds. FIs focusing on SMEs like SIDBI could offer such special Repo windows.
   ii. To ensure that SME bond repo does not lead to any pocket of risk concentration, appropriate haircut needs to be set based on SME Credit rating
   iii. Reduce landed cost of the bonds - No stamp duty to be levied on SMEs for issuing bonds, which are expected to have higher spreads than high rated corporate bonds
(d) Broaden investor base by encouraging participation of retail, QIIs, HNW investors, offer additional tax break on interest income from debt market instruments over and above current limit of Rs.5,000
(e) Establish stop loss threshold during volatile and illiquid market to mitigate risks of market makers. This will set limits on when quotes can be suspended by market makers driven by either market circumstances or issuer performance.

6.2 Application of external impetus to break the low level equilibrium

Application of quantum forces is a pre-requisite to break the vicious cycle of private placement preference – lack of transparency - lack of investors – lack of liquidity and vice versa. This can be implemented by complementing transformation in institutional architecture with multiple public placement of high volume, good quality bonds of varying maturity.

(a) Encourage public issue of bonds over private placement - revise private placement norms.
- For placement to >30 investors, public issue of bonds are required (vis-à-vis 50 investors currently)
- Corporates issuing bonds for more than Rs. 4,000 Cr in a financial year shall make public issue of bonds for atleast 30% of their fund requirements

(b) With Banks fast reaching their lending limits for the infrastructure sector, the corporate bond market will be elevated in its role as a resource mobiliser for the infrastructure sector. To ensure much of these funds continue to circulate in the secondary market and offer liquidity, the following recommendations are suggested on infrastructure corporate bonds -
- All infrastructure bonds to be exchange traded with a minimum lot size of Rs. 5000/-
- Increase deduction under section 80CCF from infrastructure bonds from Rs. 20,000 to Rs.50,000

(c) Issuers encouraged to incentivize arrangers for offering market maker services in the secondary market for at least 1 year post issue closure for a fee. To ensure this does not increase the landed cost of bonds, the fee should not involve minimum guarantee but rather volume driven.

7. Conclusions

Analytical view on debt market and economic theory indicate that –

a) Though issuing bond could be a preferred mode of financing in a wide array of situations, high costs of funds has been a key deterrent to growth of Indian corporate bond market. This in turn affects the mobilization of funds to the most productive sector and cut down investment via higher costs of financing. Key factors alleviating cost of funds are liquidity and transparency

b) The current market structure for corporate bonds is not an efficient response to transparency and liquidity issues but rather reinforces it further. As a result, changes to improve efficiency of the bond market will not emerge spontaneously from the market given the current market structure but would require external impetus in the form of regulatory / policy intervention

c) Any policy intervention should be holistic and focus on simultaneous combination of initiatives that would bring about step change in the corporate bond market rather than attempt incremental piecemeal changes sequentially. This will enable the market to transform from current equilibrium (albeit low level) to a higher level equilibrium

In this paper, we have tried to measure lack of depth in the market for financing which dampens investment and growth of firms, especially belonging to small and medium sectors. Information asymmetry, liquidity and lack of market making are the greatest impediments to development of corporate bond markets which might get stuck in the low level equilibrium. We made an attempt to analyze these issues and provided some meaningful recommendation to eliminate these problems.

A vibrant bond market for the private firms and corporation can ease financing constraints both in terms of cost of funds as well as ease of access to funds.

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