A Study of Market Discipline in Indian Banking: Role of Subordinated Debt Market

Abhijit Sarkar[†‡] **and L. M. Bhole**[§]

Abstract

Though Basel II has been adopted by many emerging economies and guidelines on Market Discipline have been issued, question may be raised as to what extent market can act as an effective disciplinary force in these immature financial markets. This paper examines risk sensitivity of Indian banks' subordinated debt (SND) spreads (primary market) to ascertain whether debt investors act as a disciplinarian by discriminating across banks based on risk. A unique dataset of SND issues is compiled from issue documents filed with National Stock Exchange (NSE) at the time of issue/listing. The dataset includes issues listed with NSE as on 31st August 2007 and covers the period March 1999 to July 2007. Significant issue clustering in the highest rating-low risk categories is observed, both in terms of number and aggregate issue size. The pooled panel OLS results suggest sort of equi-spread clustering along the rating scale giving rise to a step-wise weakly monotonous increase in spread with enhanced issue risk. Dominance by government owned Public sector banks (PSB) in the SND market considerably weakens market discipline. The spread on PSB SND issues are generally lower relative to Private issues in the same rating scale. Even though more than half of the SNDs were issued over the last 28 months of the data period, no increased risk sensitivity of spreads is noticed. Issue ratings perform better as risk proxy relative to accounting measures of risks. Overall, market disciplinary role of the Indian SND market participants proves to be rather weak.

Keywords: *Basel II, Market Discipline, Subordinated Debt, Ratings*

JEL Classifications: *G12, G21, G24, G28*

[†] Senior Lecturer (Economics), School of Humanities, Social Sciences and Management, IIT Gandhinagar, Chandkheda, Ahmedabad, India, Pin Code: 382424; Email: abhijit.sarkar@iitb.ac.in

[‡] Professor (Economics), Department of Humanities and Social Sciences, IIT Bombay, Mumbai, India, Pin Code: 400076.

[§] Contact Author and Presenter

1. Introduction

The New Basel Capital Accord (Basel II) is based on three mutually reinforcing "pillars": *minimum capital requirements*, *supervisory review*, and *market discipline*. The Basel Committee defines Market discipline, the final and third pillar of this three-pronged approach, as "…disclosure requirements that would allow market participants to assess the strength of individual banks" (Basel, 2001). In banking it is commonly understood as a situation in which private sector agents (e.g., holders of bank liabilities such as equity, deposits, subordinated debt etc.) face costs that are positively related to bank risks, and react on the basis of these costs (Berger, 1991). For example, a bank's equity price may fall in face of higher risk. Similarly, depositors may react adversely in face of worsening bank risk profile by shifting their deposits elsewhere or, demanding a higher interest rate.

There are a number of potential benefits from enhancing market discipline in a country's banking sector. It has the potential to reduce moral hazard incentives, improve the overall efficiency of the banking system (Berger, 1991) as well as the efficacy of the supervisory process (Flannery, 1998). It might also be able to supplement traditional supervisory assessments to distinguish good banks from bad ones and thereby lower overall social costs of bank supervision (Flannery, 2001), especially in the context of ever increasing complexity of the banking system. The potential benefits of market discipline can be particularly important in developing economies, primarily because of their predominantly bank based financial system. However, as observed by Llewellyn (2001), markets are concerned only with the private costs of bank failures and actual social costs may exceed the private cost. Consequently, market discipline can only complement and not supplant supervision. Moreover, for market discipline to be effective, supervisors are required to ensure reliable and accurate accounting standards, timely disclosure of sufficient information, markets for bank securities, a credible safety net that at the same time minimises moral hazard problems etc. The idea is not that market monitoring can effectively replace official supervision, but that it has a potentially powerful role *within* the overall regulatory regime.

The studies by Beck et al. (2003) and Barth et al. (2004) find support for this complementary relationship between supervision and market discipline. They show that except in environments with well-developed institutional checks and balances and a highly developed and independent information dissemination mechanism, improving supervisory powers actually have a negative impact on financial sector development. Instead, banking systems work better where market discipline is fostered by strict accounting and auditing rules, use of international rating agencies by banks, and a limited safety net with established credibility. One important question that can be raised in this context is the extent to which market can be relied upon to act as an effective disciplinary force in the immature financial markets dotting the developing economies. Caprio and Honohan (2004) find that despite the deficiencies of the financial markets, there is no systematic tendency for low-income countries to lack the pre-requisites for market discipline. According to them, the factors offsetting the weaker market and lack of a well developed formal information infrastructure are (i) the less complex character of banking business, (ii) the growing internationalisation in terms of both financial inflow and outflow, and (iii) the smaller size of the business and financial community.

The studies on market discipline in the banking sector mainly follow any of the following three different approaches: (a) *market discipline by depositors,* (b) *market discipline by equity market participants* and (c) *market discipline by (uninsured) subordinated debt* (SND) *holders.* In addition, the role of information specialists (e.g., rating agencies[1], external auditors, analysts etc.) in fostering market discipline has also been examined in a limited number of studies. The incentive for such specialised agencies does not lie in the future value of the banks' security, but on their own reputation and accreditation. Reputation arises because the demand for the services of such firms depends on the degree to which they are perceived as trustworthy and reliable by the major users of the information they provide (Caprio and Honohan, 2004).

---

[1] See Carlos and Helmut (2003), Gropp and Richards (2001), Bruni and Paterno (1995), Schweitzer et al. (1992).

Majority of the existing studies on market discipline pertain to the developed financial markets, especially US. Literature related to the emerging economies has started to appear in the recent times, but are still limited in both volume and coverage. Among the different markets like equity, debt, bank deposits, etc. which may effectively discipline banks, this paper focuses solely on SND issuance by Indian banks. The only other study covering subordinated debt issuance in the context of emerging economies, even though a descriptive one, is Calomiris and Powell (2000) which shows that Argentine banks achieving highest degree of compliance with the mandatory SND policy over the period 1993-99 are also relatively strong, both in terms of higher deposit growth and lower interest payout. The present paper makes an attempt to address this gap in the literature by examining the experience of subordinated debt issuance by Indian banks.

Indian banking system has been made fully Basel I compliant and the Basel II standards will be fully implemented in two phases by March 31, 2009. In the first phase ending March 31, 2008, the foreign banks operating in India and the Indian banks with international operational presence have already been made Basel II compliant. As a part of the process, Reserve Bank of India (RBI) has already issued a number of guidelines to improve *market discipline*. In this context, this paper examines the historical effectiveness of the principle of market discipline in Indian banking. The objectives of the paper can be summarised as follows:

- To ascertain whether the SND issues with inferior risk profile pay a higher spread. An affirmative result will indicate presence of market monitoring behaviour.
- To examine if issues of publicly owned banks enjoy any advantage over their private counterparts within the same risk rating category in terms of lesser spread.
- To re-examine if there has been any significant improvement over time in disciplinary role of SND market participants.
- To examine the performance of accounting measures of bank risk vis-à-vis issue ratings obtained from external rating agencies in explaining SND spreads.

The issue of market discipline in the banks' subordinated debt (SND) market is addressed by analysing the relationship between banks' SND issuance spread over treasury bonds of similar maturity and issue risk. Two different issue risk proxies are used in the analysis: (i) issue rating obtained from the external rating agencies and (ii) bank balance sheet parameters. The analysis closely follows Sironi (2003). Since the SND issues were made by banks at different dates and the total number of issues by a bank varies widely, no proper panel data set could be constructed. As a result, all the specifications are first estimated using the pooled-panel ordinary least squares (OLS) technique. Additionally, whenever adequate data points are available, the specifications are re-estimated with the inclusion of fixed effects.

In absence of any publicly available database on Indian banks' subordinated debt issues, data on such issues are obtained from the issue documents filed by the banks with National Stock Exchange (NSE) at the time of issue/listing of the debt securities at the Wholesale Debt Market (WDM) segment of the exchange. This limits the data set only to those debt issues which were listed with the NSE-WDM as on August 2007. Within this set, only the fixed rate, non-convertible, non-perpetual and issues without any call/put option are considered. The period of issue of the SND instruments analysed ranges from 19th March 1999 to 31st July 2007.

The paper proceeds as follows: a brief review of literature is presented in Section 2. The methodology of the study is specified in Section 3. Section 4 describes data sources and sample characteristics. Empirical results are presented in Section 5. Summary and conclusions are given in Section 6.

2. Literature Review

Subordinate debt (SND) is basically a financial instrument which is both unsecured and junior (subordinate) to all other creditors. Unsecured refers to the feature that there are no underlying assets of the bank that can be claimed by the SND holders in case of bankruptcy. Junior/Subordinate status stems from the condition that all other creditors (including deposit insurers) of the bank receive priority on claims in case of liquidation – only the equity holders are junior to the SND holders. If a bank is liquidated, the SND holders will get a chance to be paid back their investment only after all other creditors have been paid in full. The relatively longer maturity of SND also limits the investors' ability to avoid loss in case of bank failure. Additionally, in contrast to shareholders (and similar to the depositors), they do not participate in any upward gains from banks' risky activities. SND holders, therefore, have a strong preference for low-risk investments by the banks and an incentive to monitor the behaviour of banks. This makes SND holders a good candidate for rendering market discipline on the bank. Rational SND holders shall require a higher risk premium (i.e., higher interest rate) from higher risk banks as a compensation for extra risk that they have to assume. As a consequence, the interest rates on SND should reflect individual bank's risk.

The objective to enhance market discipline underlies the numerous proposals to introduce a mandatory subordinated debt policy that has been drafted and critically discussed during the last 15 years. These proposals[2] generally require banks to issue a minimum amount of subordinated notes and debentures (SND) which will not be covered by explicit or conjectural guarantees. The *first generation* of proposals (FDIC, 1983; Benston et al., 1986; Horvitz, 1986; Litan and Raunch, 1998) focus on the use of SND as a method of providing direct discipline by increasing the bank's cost of funding rather than by affecting its ability to obtain funds. The *second generation* of proposals (Cooper and Fraser, 1988; Keehn, 1988; Wall, 1989; Evanoff, 1993) recommend mandated issuance of SND and using a bank's ability to issue SND as a trigger to force supervisory discipline. The *third generation*

---

[2] For a review see Kwast et al. (1999), Bliss (2001), Hamalainen (2004), Evanoff et al. (2007).

proposals (Calomiris, 1997; Calomiris, 1999) call for a periodical rollover of SND which shall have a short maturity period and a cap on the payable interest rate.

The empirical literature on efficacy of SND holders as an agent for imposing discipline on banks is grossly limited to the developed financial markets, mainly US. The early studies by Beighley (1977), Fraser and McCormack (1978), Herzig-Marx (1979), Pettway (1976), Avery et al. (1988), Gorton and Santomero (1990) on US market find virtually no evidence of market discipline by SND holders. Flannery and Sorescu (1996) argue that the apparent lack of market discipline in the earlier studies is most likely a result of real or implied government guarantees during the 1980s, reinforced by the regulatory treatment of SND holders during Continental Illinois's rescue in 1984 and the formalisation of the too-big-to-fail (TBTF) doctrine by the Comptroller of the Currency in Congressional testimony. They find bank-specific risk measures to be correlated with option-adjusted spreads on extending the data coverage to include more recent period (1983-91) and this correlation increases as conjectural government guarantees weakened in the late 1980s and early 1990s. Results on similar line are also obtained by De Young et al. (1998) using data over the period 1986-95. Some of the other recent studies in the US SND market that have observed positive evidence of market discipline are Covitz et al. (2000, 2004), Hancock and Kwast (2001), Morgan and Stiroh (2001), Jagtiani and Lemieux (2001), Bliss and Flannery (2002), Goyal (2005), Ashcraft (2006), Evanoff et al. (2007) etc.

Another important question is whether market provides any additional information that has not already been identified by supervisors. De Young et al. (2001) find bank examination ratings to contain information not evident in secondary market prices. On the other hand, Berger et al. (2000) find markets to have information not available to supervisors. This may be considered as an indication that market and supervisors can complement each other. Meyer (1999), Evanoff and Wall (2001, 2002), Hancock and Kwast (2001) are some of the studies that address the potential usefulness of incorporating market information into the bank supervisory process. In contrast, Levonian (2001) indicates that potential information

content of subordinated-debt prices is already available from stock prices, although SND market data can be used as a complementary source.

Research into the characteristics of SND issuance find that (a) SND is mostly issued by larger banks and bank holding companies (Kwast et al.,1999; Lang and Robertson, 2000; Caldwell, 2005), (b) a minimum size of issuance is necessary (Kwast et al., 1999), (c) larger banks enjoy lower risk spread (Flannery and Sorescu, 1996; Morgan and Stiroh, 2001), and (d) spread on SND is influenced by issue liquidity (Hancock and Kwast, 2001) and trading frequency (Bianchi et al., 2005). Covitz and Harrison (2004) and Caldwell (2005) find evidence for *timing behaviour* by the managers in their issuance of SNDs in the sense that the issues are typically timed with the announcement of positive news, such as rating up-gradation. Covitz et al. (2004) address the issue of selection bias arising out of the possibility that the decision not to issue debt is associated with the riskiness of the non-issuing banks. Correcting for this bias with a two-stage Heckman procedure, they confirm the risk-sensitiveness of SND spreads in US. Goyal (2005) finds that bank charter values, which determine a bank's risk taking incentives, significantly affect the likelihood of restrictive covenants in bank debt contracts.

The studies discussed above are all on the US market. Research on non-US markets have only recently started to trickle in. Some of these are Sironi (2001, 2003), Caldwell (2005), Pop (2006), Iannotta (2007). The Caldwell (2005) study is on Canada and Pop (2006) covers US, Canada and Japan in addition to 14 European countries. The rest are all on European markets. Sironi (2001) describes the main characteristics of the European banks' SND issues. Sironi (2003) finds support for SND investors' sensitivity to bank risk with the exception of SND issued by public sector (government owned) banks. Sensitivity of SND spreads to measures of stand-alone risk[3] also increase over the 1990s with too-big-to-fail type implicit guarantees gradually weakening. Iannotta (2007) examines the factors affecting the dispersion of SND spread unexplained by easy-to-observe issue characteristics (ratings, size, maturity, etc.) to show that the market participants may be able to go beyond such easy-

---

[3] Measures that do not incorporate external guarantees.

to-observe variables to build its view on the issue and may do it so especially in case of more opaque issues (smaller face value, lower seniority, longer maturity, worse rating, etc.). Caldwell (2005) observes a reduction in the SND issuance by smaller Canadian banks when the perceived default risk of a bank increases, providing sort of indirect evidence of market discipline for this set of banks. The results of Pop (2006) is also consistent with the market discipline paradigm.

The only study in the context of the emerging economies, even though a descriptive one, is Calomiris and Powell (2000). The Argentine Central Bank had mandated issuance of SND each year by all Argentine banks amounting to 2 percent of their deposit base with a minimum maturity of two years as a part of the regulatory reforms to enhance bank safety and soundness in the wake of the Tequila crisis. Calomiris and Powell (2000) show that banks achieving the highest degree of compliance are also relatively strong, as indicated by deposit growth and deposit interest rate differences. Such dissimilarities are also reflected in differences in asset risk measures. Capital ratios are also higher for the low compliance banks, which reflect a combination of their asset weakness (i.e., risk based capital standards being enforced) as well as the penalty of a higher capital requirement imposed on them.

In summary, the studies overall find evidence in favour of enforcement of discipline by the subordinated debt market participants. The literature, however, predominantly concentrates on US market. It is only recently that some non-US studies have come up, though again concentrating on other developed economies (Europe, Canada, Japan). The only study covering an emerging market (Calomiris and Powell, 2000) demonstrates the possibility of usefulness of a mandatory SND requirement as a tool for enhancing market discipline even in emerging unsophisticated financial markets.

3. Methodology

Presence of market discipline in the SND market is examined by relating how primary market issue spread over treasury bonds of similar maturity corresponds to issue risk. Absence of a liquid secondary market in SNDs issued by Indian banks limits the focus of the analysis exclusively on primary market. SND issue spread is postulated to depend on (i) issue risk, (ii) the time to maturity of the issue, since it shall affect its default risk premium (Merton, 1973), (iii) the issue amount, (iv) ownership of the bank, since any implicit/explicit government guarantee may affect issue spread, and (v) the time of the issue, since bond market conditions vary over time. Additionally, a control variable for the size of the issuing bank is also considered. It is computed as the ratio of the SND issuing bank's total asset to the total assets of the largest SND issuing bank in the sample for the financial year of the observation (referred hereafter as *Relative Asset*). This variable should negatively affect spread as larger banks tend to have more diversified portfolios and also tend to benefit from implicit *too big to fail* (TBTF) guarantees (Sironi, 2003).

Two different issue risk proxies are used in the analysis: (i) issue rating[4,5] obtained from the external rating agencies, and (ii) bank balance sheet parameters. In the former case, ratings by different agencies are first arranged according to a rating scale and represented by dummy variables in the estimation. Dummy variables allow more flexibility than what would result from imposing a linear specification. In the later case, a number of bank balance sheet variables indicative of bank performance and likelihood of bank failure are used as predictor of the banks' SND issue spread. Since the bank balance sheet information becomes available only with a time lag, SND issue spread has been regressed on one period lagged balance sheet values in the second specification. The balance sheet variables considered are as follows:

---

[4] Issuer rating is not in vogue in India.
[5] Such ratings do not adjust for any external support from banks' owners, state authorities, or other official institutes.

(i) Leverage:

The ratio of total (book) liabilities to the book value of equity. Since, higher leverage entails higher default risk, it is expected to affect spread positively.

(ii) Return on Assets:

The ratio of annual net income to the average total asset over the financial year. Higher profitability generally signals greater efficiency. As profitability tends to be serially correlated, a higher value should indicate lower default risk. However, a higher value might also indicate compensation for higher risk taking and therefore, be positively correlated with issue spread (Flannery and Sorescu, 1996).

(iii) Non-performing Assets:

The ratio of net non-performing assets to total assets. Higher non-performing asset indicate lower asset quality and thus higher default risk. Thus, it should affect issue spread positively.

(iv) Capital Adequacy Ratio:

The ratio of capital of a bank to its risk-weighted assets. Higher capitalisation indicates lower default risk and therefore, should be negatively related to issue spread.

(v) Liquidity:

The ratio of (short term) liquid assets to total deposits. Considering higher liquidity improves bank credit worthiness, issue spread should be negatively related to bank liquidity.

(vi) Interaction between Leverage and Return on Asset:

The product of Leverage and Return on Assets. This variable should negatively affect SND issue spread since profitability becomes more important as leverage of a bank increases (Sironi, 2003).

In summary, the empirical analysis involves regressions of the form:

Issue Spread = f (Issue Risk, Issue Maturity, Issue Amount, Ownership, Financial Year of Issue, Relative Asset)

where, issue risk is proxied by issue ratings and one period lagged bank balance sheet parameters in alternate specifications. Financial Year of Issue is introduced in the regression using financial year dummies. The model specification closely follows Sironi (2003).

Since the SND issues were made by banks at different dates and the total number of issues by a bank varies widely, no proper panel data set could be constructed. As a result, all the specifications are first estimated using the pooled-panel ordinary least squares (OLS) technique. Additionally, whenever adequate data points are available, the specifications are re-estimated with the inclusion of fixed effects. Comparison of the fixed effects with the OLS estimates reveals whether variation in the independent variables *with in* a bank affects the spreads differently from between issuers.

4. Data Sources and Description:

4.1 Data Sources:

In absence of any publicly available database on Indian banks' subordinated debt issues, data on such issues are obtained from the issue documents filed by the banks with National Stock Exchange (NSE) at the time of issue/listing of the debt securities at the Wholesale Debt Market (WDM) segment of the exchange. This limits the data set only to those debt issues which are listed with the NSE-WDM as on August 2007. Within this set, only the fixed rate, non-convertible, non-perpetual and issues without any call/put option are considered. All such issues are denominated in Indian Rupee, unsecured and placed through private placements. The issue documents provide data on (i) issue size, (ii) issue rating, (iii) coupon rate, (iv) maturity and (v) deemed date of allotment. Such information available in the issue documents is further cross-checked with listing information available at NSE website (http://www.nseindia.com) and bank annual reports. Such is necessitated by three factors: (i) some instances of revision in issue period (affecting deemed date of allotment) and coupon rate, (ii) certain issues with multiple options, each differing in maturity and coupon rate offered, with aggregate mobilisation within the approved issue size but no pre-specified limits for individual options and (iii) inclusion of a *green shoe* option allowing banks to retain oversubscription up to a limit. In instances where data on individual options are not available (3 SND issues), a simple average of maturity and coupon rate along with total size of the issue is considered. In cases where data on additional fund mobilisation under *green shoe* option could not be obtained (2 SND issues), the size of the issue (excluding *green* shoe feature) as mentioned in the offer document is used as proxy. Additionally, where banks have issued within a limited time frame subordinated debts in multiple tranches with identical maturity and coupon rate (4 SND issues) but individual tranche sizes are unknown, such are aggregated and considered as a single issue and the deemed date of allotment of the last tranche is considered as proxy deemed date of allotment for the whole lot. Another 2 debt issues are dropped from the data set due to non-availability of full required information. This results in a sample size of 203 fixed rate, non-convertible, non-perpetual and non-

call/putable subordinated debt issues, which includes 9 data points with aforementioned adjustments. The period of issue of the SND instruments ranges from 19th March 1999 to 31st July 2007. The SND issues which are unrated or, for which rating information is not available (8 SND issues) are assigned to the lowest rating category. Issue coupon rates are annualised in cases of semi-annual interest payment.

Portfolio Yield to Maturity (YTM) of various NSE Government Securities Indices (Pawaskar et al., 2002) with differing (average) residual maturity are used to compute the spread between the coupon rate of SND issues and Government Securities of similar maturity. Use of indices data as a proxy for YTM on Government Securities is mainly to circumvent the problems arising out of lack of liquidity in the Indian debt market, more so in the earlier phase of the data period. Among the available NSE Government Securities Indices (NSE-GSI), YTM data on (i) Dated Government Securities Index, (ii) Medium Term (Bonds with residual maturity of 3-8 years) Government Securities Index and (iii) Long Term (Bonds with residual maturity above 8 years) Government Securities Index are utilised. Such indices values, their (average) residual maturity and (portfolio) YTM are available on a daily basis since January 1997. Availability of daily data for such indices helps in proper matching of an SND issue information with corresponding Government Securities Indices information for the purpose of calculating the spread. Whenever the maturity of an SND issue closely matched the (average) residual maturity of any of the NSE-GSI, the corresponding YTM figure for the NSE-GSI is directly used to compute the spread. Interpolated yield curves are used in other instances.

Data on bank specific accounting variables (Leverage, Return on Assets, Non-performing Assets, Capital Adequacy Ratio and Liquidity) for the period March 1998-March 2006 are obtained from Reserve Bank of India (RBI) interactive online database (http://www.rbi.org.in). The relevant data for the financial year ending March 2007 is obtained from *Capitaline* database. Classification of banks into Public and Private banks follows RBI classification. Government of India is the majority (more than 50% of issued capital) shareholder in all the Public sector banks.

4.2 Data Description:

The SND issues under study have been rated by 4 rating agencies, viz. CARE, CRISIL, FITCH India and ICRA. The ratings assigned to the issues under study ranges from triple-A to triple-B categories. The ratings are classified in a 9-point scale as presented in Table 1. The 8 SND issues for which rating information could not be obtained have been classified in the lowest category (triple-B).

Table 1: Rating Scale

		Assigned Rating								
Rating Scale		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Rating Agency	ICRA	LAAA	LAA+	LAA	LAA-	LA+	LA	LA-	LBBB+	LBBB
	CARE	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB
	CRISIL	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB
	FITCH (India)	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB

Rating assigned to an issue by one or more of the rating agencies are represented by 8 dummy variables, Ri, with triple-A rated issues (rating scale 1) taken as base. Thus, Ri=1 when the issue corresponds to rating (scale) i and 0 otherwise, where i=2, … , 9. Dummy variables allow more flexibility than would result from imposing a linear specification (Sironi, 2003).

A summary of bank-wise data on the SND issues is presented in Table 2. The SND issues have been made by 39 Indian banks in total, 24 of which are Public Sector (majority Government holding) banks accounting for 108 of the 203 issues under study. It can be noticed that some of the bank SND issues have negative minimum spread. Two factors can be said to have contributed to this: (i) index YTM, rather than actual Government Security of corresponding maturity, is used to compute spread to tide over liquidity problem in the Indian debt market and (ii) volatility in YTM even within a short time span. Additionally, the last date of the issue period and the deemed date of allotment are always not the same

Table 2: Bank-wise Issue Summary

	Ownership	N	Rating Scale				Spread (Basis Point)				Issue Size (Rs. Crore)				
			Mean	Median	Min	Max	Mean	Median	Min	Max	Mean	Median	Total	Min	Max
1 Allahabad Bank	Public	3	3.0	3	3	3	40.17	30.17	29.46	60.88	420.63	500.00	1261.90	200.00	561.90
2 Andhra Bank	Public	3	2.0	2	2	2	77.15	36.73	22.49	172.23	138.33	140.00	415.00	75.00	200.00
3 Bank of Baroda	Public	5	1.0	1	1	1	57.93	29.00	-10.65	186.00	539.82	409.10	2699.10	300.00	920.00
4 Bank of India	Public	6	2.0	2	2	2	10.97	10.87	4.44	19.54	375.00	325.00	2250.00	200.00	750.00
5 Bank of Maharashtra	Public	5	3.0	3	3	3	26.57	17.50	8.28	65.52	178.50	200.00	892.50	100.00	225.00
6 Bharat Overseas Bank	Private	1	5.0	5	5	5	137.96	137.96	137.96	137.96	20.00	20.00	20.00	20.00	20.00
7 Canara Bank	Public	10	1.0	1	1	1	29.37	23.94	-12.50	126.97	341.35	370.00	3413.50	75.45	575.00
8 Catholic Syrian Bank	Private	3	6.7	6	8	6	84.31	68.70	36.82	147.42	23.90	16.00	71.70	15.70	40.00
9 Central Bank of India	Public	7	3.0	3	3	3	56.28	41.61	-17.31	139.37	163.31	184.00	1143.20	16.00	378.20
10 Corporation Bank	Public	1	1.0	1	1	1	25.62	25.62	25.62	25.62	300.00	300.00	300.00	300.00	300.00
11 Dena Bank	Public	4	5.8	6	6	5	45.58	40.85	21.62	79.00	133.75	125.00	535.00	75.00	210.00
12 Dhanalakshmi Bank	Private	4	8.3	8	9	8	152.38	152.54	122.30	182.13	20.50	18.50	82.00	10.00	35.00
13 Federal Bank	Private	6	4.0	4	5	3	96.03	115.15	37.55	139.05	120.00	45.50	720.00	14.00	450.00
14 HDFC Bank	Private	10	1.0	1	1	1	26.88	19.21	-1.76	78.08	201.20	236.00	2012.00	5.00	395.00
15 ICICI Bank	Private	18	1.0	1	1	1	37.74	38.42	-8.39	100.02	327.50	98.00	5895.00	14.00	2000.00
16 IDBI	Public	11	2.0	2	2	2	26.21	34.30	-47.56	88.85	213.27	210.00	2346.00	15.00	448.00
17 IDBI Bank	Private	1	4.0	4	4	4	76.74	76.74	76.74	76.74	130.00	130.00	130.00	130.00	130.00
18 Indian Bank	Public	1	3.0	3	3	3	-5.84	-5.84	-5.84	-5.84	300.00	300.00	300.00	300.00	300.00
19 Indian Overseas Bank	Public	8	2.1	2	3	2	28.58	23.80	-8.74	102.74	246.88	200.00	1975.00	150.00	500.00
20 IndusInd Bank	Private	6	5.0	5	5	5	123.52	129.68	62.76	160.00	89.52	82.25	537.10	35.50	172.10
21 ING Vysya Bank	Private	5	2.0	2	2	2	91.45	102.60	38.93	116.74	78.00	60.00	390.00	12.00	200.00
22 Karnataka Bank	Private	1	5.0	5	5	5	216.30	216.30	216.30	216.30	75.00	75.00	75.00	75.00	75.00
23 Kotak Mahindra Bank	Private	14	2.0	2	2	2	40.75	20.24	-23.57	147.08	26.04	26.05	364.50	1.00	50.00
24 Laxmi Vilas Bank	Private	5	6.0	6	6	6	153.76	165.00	102.77	197.56	22.00	19.00	110.00	10.00	40.00
25 Oriental Bank of Commerce	Public	3	1.0	1	1	1	67.03	65.32	5.00	130.77	400.00	500.00	1200.00	200.00	500.00
26 Punjab and Sindh Bank	Public	1	5.0	5	5	5	40.38	40.38	40.38	40.38	150.00	150.00	150.00	150.00	150.00
27 Punjab National Bank	Public	8	1.0	1	1	1	44.06	50.40	2.21	90.48	369.35	297.50	2954.80	95.00	884.80
28 State Bank of Bikaner and Jaipur	Public	3	1.0	1	1	1	25.27	13.96	-7.30	69.15	333.33	300.00	1000.00	200.00	500.00
29 State Bank of India	Public	3	1.0	1	1	1	55.15	49.00	-5.78	122.22	2152.73	1675.20	6458.20	1500.00	3283.00
30 State Bank of Patiala	Public	1	1.0	1	1	1	-3.19	-3.19	-3.19	-3.19	750.00	750.00	750.00	750.00	750.00
31 State Bank of Travancore	Public	1	1.0	1	1	1	-30.07	-30.07	-30.07	-30.07	195.00	195.00	195.00	195.00	195.00
32 Syndicate Bank	Public	5	2.2	2	3	2	12.02	11.58	-2.20	28.20	285.00	200.00	1425.00	100.00	500.00
33 UCO Bank	Public	6	4.0	3	9	3	30.35	26.41	-7.15	68.61	225.00	250.00	1350.00	150.00	300.00
34 Union Bank of India	Public	5	2.0	2	2	2	7.12	1.51	-17.82	40.14	380.00	400.00	1900.00	200.00	600.00
35 United Bank of India	Public	4	3.0	3	3	3	67.79	54.43	20.60	141.69	175.00	150.00	700.00	100.00	300.00
36 United Western Bank	Private	4	8.0	8	9	7	205.15	205.07	145.47	265.00	21.55	22.60	86.20	1.00	40.00
37 UTI Bank	Private	16	4.4	3	9	2	110.31	91.42	24.91	225.99	77.03	41.75	1232.40	5.00	360.00
38 Vijaya Bank	Public	4	2.3	2	3	2	55.87	41.30	19.21	121.68	212.50	225.00	850.00	150.00	250.00
39 Yes Bank	Private	1	4.0	4	4	4	100.99	100.99	100.99	100.99	180.00	180.00	180.00	180.00	180.00

and there has been a change in YTM data over this gap period. A case in point is YTM behaviour during the 3 Kotak Mahindra Bank SND allotments with identical coupon rate and maturity over a short time span of 15 days (2nd – 17th November, 2004). The Maturity/YTM profile of the 3 NSE-GSI used over the same period is presented in Table 3. Despite such periodical wide fluctuations, no bank with more than 1 SND issue over the period under study has a negative mean/median spread (Table 2).

Table 3: Maturity and YTM data on NSE-GSI for the period 02/11/2004 to 17/11/04

Date	Dated NSE-GSI		Long-term NSE-GSI		Medium-term NSE-GSI	
	Avg. Residual Maturity *(in Years)*	Portfolio YTM *(in %)*	Avg. Residual Maturity *(in Years)*	Portfolio YTM *(in %)*	Avg. Residual Maturity *(in Years)*	Portfolio YTM *(in %)*
20041102	9.977	7.451	14.536	7.466	5.650	7.340
20041103	9.974	7.296	14.533	7.359	5.647	7.080
20041104	9.971	7.305	14.531	7.366	5.644	7.100
20041105	9.968	7.533	14.528	7.573	5.641	7.429
20041106	9.966	7.318	14.525	7.298	5.638	7.388
20041108	9.960	7.313	14.519	7.242	5.633	7.522
20041109	9.969	7.860	14.577	7.965	5.627	7.493
20041110	9.966	7.741	14.575	7.814	5.624	7.431
20041111	9.963	7.791	14.572	7.886	5.622	7.429
20041113	9.958	7.741	14.566	8.042	5.616	6.788
20041116	9.949	7.796	14.558	7.837	5.608	7.553
20041117	9.946	7.821	14.555	7.867	5.605	7.565
Maximum	9.977	7.860	14.577	8.042	5.650	7.565
Minimum	9.946	7.296	14.519	7.242	5.605	6.788
Average	9.964	7.581	14.548	7.643	5.630	7.343

State Bank of India, a PSB and the largest Indian bank, came out with the largest single SND issue by any Indian Bank (Rs. 3283 crores) as well as topped the chart in aggregate mobilisation (Table 2). It is followed by ICICI bank, the largest Private bank and the second largest Indian bank, in terms of both single issue and aggregate size.

8 among the 39 banks have experienced (issue) rating migration over the study period, with 3 declines and 7 improvements in risk rating category. The fall is by two risk rating scale in

2 cases among the declines (Catholic Syrian Bank, 2004-05 to 2005-06, from 6 to 8 and Federal Bank, 2005-06 to 2006-07, 3 to 5). In all other cases, the migration is by 1 rating scale over subsequent issue financial year.

As can be seen from Table 4, majority of SND issuing banks and their issues fall in the top 3 rating scale categories. This can be said to be more on account of the clustering of the Public Sector Banks (PSBs) in the top of the scale – 102 of the 108 SND issues of the PSBs fall in this category. Though to a lesser extent, the SND issues of the Private Banks are also nevertheless skewed towards the top rating categories, with 54 of their 95 issues achieving top 2 risk ratings.

Table 4 also shows an overall *weakly* monotonous increase in the mean/median spread with deterioration in (issue) risk rating. However, a clear distinction can be drawn in the spread behaviour between Public and Private banks. The mean spread of the PSBs do not show any significant increase with a fall in the risk rating category in sharp contrast to a general increase in spread for the Private banks. This suggests a lack of the market disciplinary effect on the SND issues by the PSBs. Additionally, except for the highest rating category, the mean spread of the PSB SND issues are seen to be uniformly lower compared to the spread for the Private banks' SND issues in the corresponding rating scale. The spread figures of the two bank group's SND issues are, however, comparable for the highest risk rating category. This suggests some sort of *interest subsidy* enjoyed by the PSBs due to an *implicit* government guarantee.

Considering that the PSBs are generally larger in size relative to Private banks, the SND issue market is dominated by the PSBs in terms of aggregate issues, with total issues in excess of 3 times that of Private banks. It is also to be noted that more than 50% of total issues by both the PSBs and Private banks fall in the top most risk rating category. Average size of the SND issues is also larger for PSBs. This is true even for the top 2 risk rating categories where most of the Private SND issues (54 out of 95) are concentrated. Both the

Table 4: Rating Scale Based Issue Summary

	Rating Scale	1	2	3	4	5	6	7	8	9	Overall
	No. of Banks	11	10	11	3	6	3	1	2	4	39
	Public	*9*	*7*	*9*	*0*	*2*	*1*	*0*	*0*	*1*	*24*
	Private	*2*	*3*	*2*	*3*	*4*	*2*	*1*	*2*	*3*	*15*
	No. of Issues	63	65	34	4	12	10	2	4	9	203
	Public	*35*	*39*	*28*	*0*	*2*	*3*	*0*	*0*	*1*	*108*
	Private	*28*	*26*	*6*	*4*	*10*	*7*	*2*	*4*	*8*	*95*
Spread (Basis Points)	Mean	36.80	39.76	44.98	112.05	115.64	103.50	147.35	155.55	182.54	58.44
	Public	*39.16*	*26.09*	*41.07*	*--*	*31.00*	*53.57*	*--*	*--*	*61.00*	*35.38*
	Private	*33.86*	*60.28*	*63.26*	*112.05*	*132.57*	*124.90*	*147.35*	*155.55*	*197.73*	*84.65*
	Std. Dev.	40.63	49.85	37.15	28.72	54.61	60.18	2.67	26.44	63.84	60.16
	Median	29.00	24.91	37.01	116.22	128.72	90.89	147.35	158.88	178.16	39.49
	Min	-30.07	-47.56	-17.31	76.74	21.62	26.90	145.47	122.30	61.00	-47.56
	Max	186.00	172.23	141.69	139.05	216.30	197.56	149.24	182.13	265.00	265
Issue Size (Rs. Crore)	Aggregate	26877.60	12354.80	6142.60	385.00	1592.10	466.70	55.00	112.00	384.30	48370.10
	Public	*18970.60*	*10711.00*	*5947.60*	*0.00*	*360.00*	*325.00*	*0.00*	*0.00*	*150.00*	*36464.20*
	Private	*7907.00*	*1643.80*	*195.00*	*385.00*	*1232.10*	*141.70*	*55.00*	*112.00*	*234.30*	*11905.90*
	Mean	426.63	190.07	180.66	96.25	132.68	46.67	27.50	28.00	42.70	238.28
	Public	*542.02*	*274.64*	*212.41*	*0.00*	*180.00*	*108.33*	*0.00*	*0.00*	*150.00*	*337.63*
	Private	*282.39*	*63.22*	*32.50*	*96.25*	*123.21*	*20.24*	*27.50*	*28.00*	*29.29*	*125.33*
	Std. Dev.	563.09	167.60	129.48	73.40	115.61	47.06	17.68	11.22	45.77	358.08
	Median	265.00	200.00	179.50	95.50	106.50	24.50	27.50	27.50	33.00	150.00
	Min	5.00	1.00	5.00	14.00	20.00	10.00	15.00	17.00	1.00	1.00
	Max	3283.00	750.00	561.90	180.00	450.00	150.00	40.00	40.00	150.00	3283.00

overall mean and median size of issues also show a generally declining trend. This can be said to be true even for the Private banks, except for spurt in the middle.

Table 5 shows the distribution of the SND issues over the different financial years from 1998-99 to 2007-08 (up to 31st July 2007). The SND issues can be seen to gather some momentum from the 2002-03 financial year and took off only in 2005-06. 108 of the 203 SND issues came up over the last 28 months of the data period (1st April, 2006 to 31st July, 2007). It is to be noted that no SNDs have been issued in 1999-2000.

Out of the 9 issues by the Private banks in 2002-03, 8 are unrated or, issues for which rating information are unavailable, resulting in their slotting into the lowest rating category and thus affecting the mean rating of the Private banks' SND issues for the year. Thereafter, there is a general improvement over 2004-07 in the risk rating of the SND issues at the overall level as well as for both PSB and Private banks' SND issues. A similar improvement in the median rating as well as a decline in the volatility over the same period further strengthens the trend. It suggests that banks with better risk profile are finding it easier relative to others to access the market for funding.

No secular trend could be observed in the behaviour of the spread over the period of study. A wide fluctuation in mean as well as median spread on SND issues can be observed both for the full set of banks' and its PSB and Private sub-group of banks. One distinctive feature, however, for the SND spreads is that the mean spread of the Private banks' SND issues are uniformly higher relative to PSB SND issues across the data period.

As expected with the heavy clustering of the SND issues over the last 28 months of the data period, a significant share of the total SNDs (size) has also been issued over the last 3 financial years. A general increasing trend in mean and median issue size since 2002-03 is observed with a pronounced jump in 2005-06. Some large issues by the two largest Indian

Table 5: Financial Year (April – March) Based Issue Summary

Financial Year (April-March)		FY99	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	Overall
No. of Issues		1	3	3	25	31	32	62	43	3	203
	Public Banks	*1*	*3*	*3*	*16*	*14*	*18*	*28*	*23*	*2*	*108*
	Private Banks	*0*	*0*	*0*	*9*	*17*	*14*	*34*	*20*	*1*	*95*
Rating Scale	**Mean**	1.00	2.67	2.00	4.60	3.39	2.75	2.10	2.26	2.67	2.75
	Public Banks	*1.00*	*2.67*	*2.00*	*2.63*	*2.36*	*2.22*	*2.00*	*1.96*	*1.50*	*2.17*
	Private Banks	*--*	*--*	*--*	*8.11*	*4.24*	*3.43*	*2.18*	*2.60*	*5.00*	*3.41*
	SD		2.89	1.00	3.34	1.99	1.78	1.57	1.54	2.08	2.11
	Median	1	1	2	3	3	2	2	2	2	2
	Min	1	6	3	9	8	8	9	8	5	9
	Max	1	1	1	1	1	1	1	1	1	1
Spread (Basis Point)	**Mean**	186.00	52.33	130.60	93.34	68.61	20.84	33.09	80.95	156.25	58.44
	Public Banks	*186.00*	*52.33*	*130.60*	*41.23*	*22.20*	*5.94*	*5.46*	*69.73*	*126.23*	*35.38*
	Private Banks	*--*	*--*	*--*	*185.98*	*106.82*	*39.98*	*55.85*	*93.86*	*216.30*	*84.65*
	SD	186.00	25.17	46.64	81.75	59.19	35.24	45.33	46.13	52.20	60.16
	Median	186.00	49.00	139.37	61.00	41.61	15.08	24.76	69.15	130.77	39.49
	Min	186.00	29.00	80.20	-1.33	2.68	-30.07	-47.56	2.21	121.68	-47.56
	Max	186.00	79.00	172.23	265.00	171.88	131.59	147.42	197.56	216.30	265.00
Issue Size (Rs. Crore)	**Aggregate**	300.00	2159.30	470.00	3364.80	4541.50	4907.90	18164.60	13687.00	775.00	48370.10
	Public Banks	*300.00*	*2159.30*	*470.00*	*2955.00*	*3360.00*	*4436.00*	*12258.20*	*9825.70*	*700.00*	*36464.20*
	Private Banks	*--*	*--*	*--*	*409.80*	*1181.50*	*471.90*	*5906.40*	*3861.30*	*75.00*	*11905.90*
	Mean	300.00	719.77	156.67	134.59	146.50	153.37	292.98	318.30	258.33	238.28
	Public Banks	*300.00*	*719.77*	*156.67*	*184.69*	*240.00*	*246.44*	*437.79*	*427.20*	*350.00*	*337.63*
	Private Banks	*--*	*--*	*--*	*45.53*	*69.50*	*33.71*	*173.72*	*193.07*	*75.00*	*125.33*
	SD	*--*	844.12	124.53	122.10	131.59	131.37	486.76	394.65	218.42	358.08
	Median	300.00	409.10	95.00	100.00	125.00	158.75	200.00	200.00	200.00	150.00
	Min	300.00	75.00	75.00	1.00	5.00	1.00	3.00	14.00	75.00	1.00
	Max	300.00	1675.20	300.00	450.00	500.00	500.00	3283.00	2000.00	500.00	3283.00

Note: (i) *FY99 covers the period 1ˢᵗ April 1998 to 31ˢᵗ March, 1999; and so on.*
  (ii) *FY08 covers the period 1ˢᵗ April 2007 to 31ˢᵗ July, 2007 only.*
  (iii) *There were no issues in the financial year 1999-2000 and hence, FY00 is omitted.*

banks, State Bank of India (Public bank) and ICICI Bank (Private bank), over the last two financial years play a major contributor to this trend.

In summary, the data on SND issues by the Indian banks show a significant clustering in the highest risk rating categories, both in terms of number of issues and aggregate size of the issues. The SND issue market is dominated by the Public sector banks. This is expected given the dominance of the PSBs in the Indian banking scenario. Moreover, considering the rapid economic growth in recent times, the resultant increase in bank business and thus capital requirement, more of the SND issues have come up only in the recent times. Spread of PSB SND issues do not show any significant increase with worsening risk profile. Market disciplinary forces, even if active at the overall level, are thus significantly weaker for the PSBs. The PSBs also enjoy sort of *interest subsidy* in the sense that the spread on PSB SND issues are generally lower (except at the top most rating scale) than the Private banks' SND issues in corresponding risk rating scale. The mean/median rating of SND issues are also seen to be showing an improving trend with a corresponding fall in rating volatility in the recent times. Considering that SND issue by banks in the recent past (2003-04 to 2006-07) have not seen any major widespread rating upgrades, this can be said to suggest that the banks with better risk profile are finding it easier to access the market for new SND issues compared to the lesser banks.

The descriptive statistics of the data set are presented in Table 6(a).

Table 6(a): Sample Summary Statistics

	N	Mean	Median	Min	Max	Std. Dev.
Rating Scale	203	2.75	2.00	1.00	9.00	2.11
Spread (Basis Point)	203	58.44	39.49	-47.56	265.00	60.16
Maturity (Years)	203	8.84	9.58	5.00	15.00	1.79
Issue Size (Rs. Crore)	203	238.28	150.00	1.00	3283.00	358.08
Leverage (Ratio)	203	17.01	17.58	6.08	30.25	4.89
Return on Assets (%)	203	1.02	1.03	-0.83	2.40	0.48
Non-performing Assets (%)	203	2.94	2.13	0.00	16.31	2.71
Capital Adequacy Ratio (%)	203	11.56	11.78	4.36	18.16	2.36
Liquidity (%)	203	13.02	11.31	5.32	37.43	5.93

The correlation matrix of explanatory variables is presented in Table 6(b):

Table 6(b): Correlation Matrix

	MAT	SIZE	LEV	RoA	RL	NPA	CAR	LIQ	RA
Maturity (MAT)	1.00								
Issue Size (SIZE)	0.25	1.00							
Leverage (LEV)	-0.28	0.14	1.00						
Return on Assets (RoA)	0.33	0.00	-0.53	1.00					
RoA*LEV (RL)	0.18	0.20	0.18	0.69	1.00				
Non-Performing Assets (NPA)	-0.49	-0.10	0.49	-0.47	-0.15	1.00			
Capital Adequacy Ratio (CAR)	0.32	0.11	-0.53	0.40	0.08	-0.51	1.00		
Liquidity (LIQ)	-0.14	-0.02	-0.16	-0.03	-0.08	-0.10	0.27	1.00	
Relative Asset (RA)	0.07	0.28	-0.08	-0.03	-0.05	-0.06	0.07	0.10	1.00

5. Estimation Results:

5.1 Impact of Issue Ratings on SND Spreads:

Table 7 presents the pooled-OLS and FE estimation results of the regression of SND spread on issue ratings. Only the issue ratings are considered as explanatory variables in Model 1. Model 2 augments it further by additionally considering a number of control variables. Comparison of the FE with the OLS estimates reveals whether variation in the independent variables *within* a bank affects the spreads differently than *between* issuers.

For the (robust) OLS estimation of Model 1, increasing (except for issues in rating scale 6, R6) rating dummy coefficients with lower rating scale indicate that spreads increase with worsening of risk profile of banks. However, the coefficients of the rating dummies corresponding to the top 2 rating categories are statistically insignificant though positive. The hypothesis R2=R3 also cannot be rejected. This suggests that no higher differential spread is charged on the SND issues rated in the 2 immediately lower categories relative to the highest rated issues. Considering 99 out of 140 (total issues of 203 less 63 in the highest rating scale considered as base) SND issues are rated in this category, this suggests a sort of failure by the investors to adequately differentiate between issue risks, however subtle it may be, among the issues in the top 3 rating scale. The issues further down the rating scale though have to pay a relatively higher spread. However, in the lower down the risk rating order too the hypotheses R4=R5=R6 and R7=R8=R9 cannot be rejected at any conventional level of significance. The hypotheses R3=R4 and R6=R7 are rejected at 1% and 5% level of significance respectively. This suggests some sort of equi-spread clustering along the rating scale among the categories 1-3, 4-6 and 7-9 giving rise to a *step-wise weakly monotonous* increase in spread with worsening issue risk profile.

The R^2 value for the (robust) OLS estimation of the model is reasonable at 0.44. F-statistic shows the rating dummy coefficients to be jointly significant at 1%. However, the Ramsey

Table 7: Impact of Issue Ratings on SND Spreads

	OLS Estimator			Fixed Effect Estimator	
	Model 1	**Model 2**	**F-test**	**Model 2**	**F-test**
Constant	36.80***	308.38***	2733.04***	60.86	25.89***
	5.19	48.65		76.94	
R2	2.96	3.33	0.01	19.48	6.3**
	8.15	6.43		16.27	
R3	8.18	12.56**	0.28	36.52***	14.54***
	8.26	6.28		8.50	
R4	75.25***	65.31***	0.52	113.13***	8.07***
	13.74	16.84		14.38	
R5	78.84***	70.92***	0.24	50.03***	2.38
	16.29	13.53		16.38	
R6	66.70***	69.18***	0.02	46.70**	1.57
	19.18	17.97		20.90	
R7	110.55***	104.48***	1.28	9.64	109.52***
	5.37	9.06		19.33	
R8	118.75***	116.48***	0.03	123.58***	0.54
	12.81	9.65		21.51	
R9	145.74***	137.93***	0.14	113.61***	1.27
	21.17	21.57		18.75	
Maturity		0.90		2.81*	1.46
		1.58		1.46	
Issue Size		-13.83***		8.99	19.36***
		5.19		7.75	
Relative Asset		-0.33		-7.20	0.88
		7.33		10.70	
FY01		-152.50***		-143.59***	0.25
		17.99		14.16	
FY02		-62.88***		-66.93***	0.04
		21.65		19.57	
FY03		-153.28***		-158.25***	0.23
		10.31		13.34	
FY04		-155.95***		-178.47***	9.23***
		7.41		10.61	
FY05		-189.74***		-199.73***	1.99
		7.07		11.77	
FY06		-167.39***		-189.51***	9.56***
		7.15		12.10	
FY07		-121.84***		-134.75***	3.64*
		6.77		9.94	
FY08		-57.05***		-57.04***	0.00
		8.02		16.82	
N	203	203		203	
R²	0.44	0.68		0.84	
F	19.04***	20.44***		13.38***	
F(Ri)		35.01***		7.17***	
RESET	79.24***	1.65			

*Note: (i) *, ** and *** indicate significance at 10%, 5% and 1% level respectively.*
(ii) The smaller figures in italics give the standard errors.

(1969) regression specification error test (RESET) for omitted variables indicates model misspecification due to omission.

Model 2 augments Model 1 by the inclusion of Maturity (in years), Issue Size (log of Rs. size of the issue) and Relative Asset (total assets of the issuing bank relative to the largest bank in the sample for the corresponding financial year) as control variables. Additionally, considering the wide fluctuation in spreads across financial years (Table 5), financial year dummies (FY01-FY08[6]; FY99 is taken as base) are also included to capture the bond market condition. The results are presented in column 2 of Table 7.

The (robust) OLS estimation results of the augmented model are in similar line to the results of Model 1. The coefficient of the rating dummy corresponding to scale value of 3 is significant, but the hypotheses R2=R3 cannot be rejected. Similarly, the hypotheses R4=R5=R6 and R7=R8=R9 cannot be rejected. As earlier, a statistically significant increase in spread is seen to occur only with scale shift from level 3 to 4 and from 6 to 7. The F statistic of the test for equality of corresponding rating dummy coefficients of Model 1 and 2 (column 3; Table 7) can also not be rejected.

Among the newly included control variables in the estimation model, issues with higher maturity period are seen to pay a larger spread but the relationship is not statistically significant. Issues from banks with larger (total) assets can command a lower spread *cet. par.* though the relationship is again statistically insignificant. A statistically significant negative relationship though is observed between the size of an issue and spread on its coupon rate. This can be explained by the observation (Table 4) that relatively larger sized SND issues were also characterised by better risk profile. Financial year dummies are all negative significant.

---

[6] There were no issues in the financial year 1999-2000 and hence, FY00 is omitted.

The R^2 value (0.68) for the (robust) OLS estimation results for the augmented model indicates its better fit to the data. The F-statistic indicates the joint significance of the explanatory variables. The F(Ri) value also confirms the joint significance of the rating dummies. The Ramsey (1969) regression specification error test (for omitted variables) statistic can also not be rejected for the augmented model.

The fixed effect model estimates, shown in column 4 in Table 7, presents the *within* bank comparisons. The *weakly monotonous* stepwise increase in spreads with worsening risk profile is no longer seen once the unobserved bank specific factors are taken into consideration by including bank dummies in the regression model, suggesting further weakening of evidence for disciplinary role of market participants. Relative (total) asset size of issuing banks remains insignificant. SND issue size is no longer significant. Contrastingly, spread is seen to increase with maturity. The financial year dummies retain their significance. All the explanatory variables as well as the rating dummies also remain jointly significant. The F-test results in column 5 of Table 7 presents the coefficient equality test results for the OLS and FE estimations for Model 2.

5.2 Ownership Effect on Spread:

Considering that the mean spread for Public banks' SND issues are seen to be generally lower relative to their Private counterparts' issues in identical rating scale (Table 4), the model is further augmented by an ownership dummy to ascertain the effect of ownership on spread (Table 8). Separate estimations for both the sub-groups are also performed. The estimation is repeated for the full set of banks with the inclusion of fixed effects. The limited number of observations for either sub-group precluded the possibility of obtaining meaningful fixed effect estimates for individual sub-groups.

Column 1 in Table 8 presents the OLS (robust) estimation results for the full set of banks with inclusion of ownership dummy. The value of the dummy is set to 1 for Public banks and 0 for Private banks. The coefficient of the ownership dummy is negative significant, indicating the Public banks enjoy a significant *interest subsidy* relative to their Private counterparts, likely to be due to the *implicit government guarantee* to their solvency. This confirms the observations presented in Table 4.

All the rating dummies are significant for the full set of banks. The rating dummy coefficients also monotonously increase with lowering of issue risk rating. However, as earlier, coefficient values of rating dummies corresponding to adjacent rating classes are not all significantly (statistically) different. Specifically, the hypotheses R3=R4, R4=R5, R5=R6 and R8=R9 cannot be rejected at any conventional level of significance. Additionally, the hypotheses R4=R6 and R4=R5=R6 are also accepted. Overall the results suggest presence of only a *weak* market disciplinary effect in the SND issues market. Though the spread is seen to increase monotonously with worsening issue ratings, the investors somewhat fail to adequately distinguish between closely rated issues by charging additional (statistically significant) spread on marginally riskier issues.

Table 8: Ownership Effect on Spread

	OLS Estimator				Fixed Effect Estimator	
	All Banks	**Public Banks**	**Private Banks**	**F-test**	**All Banks**	**F-test**
Constant	175.50***	167.27**	8.50	4.59**	118.21*	0.98
	57.99	74.13	84.24		65.33	
R2	12.47*	4.72	20.80	7.56***	19.48	1.19
	6.41	5.85	13.40		16.27	
R3	26.64***	21.77***	32.89**	2.57	36.52***	2.28
	6.54	6.94	12.56		8.50	
R4	54.63***		55.47***		113.13***	9.09***
	19.40		20.52		14.38	
R5	61.53***	3.68	72.33***	14.61***	50.03***	0.97
	11.67	17.96	12.91		16.38	
R6	73.46***	32.51**	97.15***	18.69***	46.70**	2.69
	16.31	14.95	18.12		20.90	
R7	100.54***		96.81***		9.64	98.14***
	9.18		13.99		19.33	
R8	112.96***		115.36***		123.58***	1.43
	8.88		12.59		21.51	
R9	131.18***	38.40***	144.82***	125.36***	113.61***	0.78
	19.88	9.50	26.79		18.75	
Maturity	0.39	3.85	-1.38	4.01**	2.81*	2.89*
	1.42	2.61	1.78		1.46	
Issue Size	4.75	-2.83	7.06	1.78	8.99	0.39
	6.81	7.41	8.88		7.75	
Relative Asset	0.77	6.77	-11.33	12.17***	-7.20	1.14
	7.44	5.19	7.54		10.70	
Ownership	-39.21***				-57.35***	4.41**
	8.64				22.02	
FY01	-158.26***	-140.13***			-143.59***	1.13
	13.81	12.54			14.16	
FY02	-66.00***	-57.93***			-66.93***	0
	22.59	26.36			19.57	
FY03	-159.03***	-141.47***			-158.25***	0.01
	10.39	11.86			13.34	
FY04	-171.40***	-167.58***	-6.72	786.69***	-178.47***	0.96
	7.21	5.74	24.23		10.61	
FY05	-203.49***	-180.10***	-59.97**	256.43***	-199.73***	0.27
	7.25	7.50	23.73		11.77	
FY06	-187.31***	-179.02***	-22.41	452.27***	-189.51***	0.09
	7.35	7.36	23.85		12.10	
FY07	-139.72***	-121.92***	14.87	308.11***	-134.75***	0.46
	7.34	7.79	24.82		9.94	
FY08	-66.64***	-64.78***	90.89***	790.73***	-57.04***	1.8
	7.15	5.54	21.85		16.82	
N	203	108	95		203	
R^2	0.73	0.73	0.76		0.84	
F	24.23***	15.26***	15.45***		13.38***	
F(Ri)	24.79***	4.04***	23.63***		50.05***	

Note: *(i) *, ** and *** indicate significance at 10%, 5% and 1% level respectively.*
      (ii) The smaller figures in italics give the standard errors.

Issue maturity and relative asset size of issuing banks remain insignificant as before (Model 2 OLS estimation, Table 7). Issue size loses its negative significant relationship with spread with inclusion of ownership dummy. Considering most of the larger SND issues are made by the Public banks, the coefficient of ownership dummy possibly explains away the effect of issue size on spread. The financial year dummies are all significant as usual. Joint significance of all the explanatory variables as well as the rating dummies are also confirmed.

The column 2 in Table 8 presents the results for the sub-group of Public banks. The results fail to show any particular pattern in spread behaviour with changes in risk ratings of SND issues. Even though all the coefficients are positive and jointly significant, individually only R3, R6 and R9 coefficients are significant. Moreover, the hypotheses R3=R6 and R6=R9 cannot be rejected. The Public banks thus not only enjoy an *interest subsidy* in the form of a lower spread, the spread also does not increase significantly with worsening of the SND issue rating. The spread charged by market participants on Public banks' SND issues thus do not appear to be determined by the issue risk but on extraneous factors. Issue maturity, size and relative asset size of issuing banks remain insignificant similar to the full set of issues.

In contrast to Public banks' issues, rating dummy coefficients increase for the Private banks with increasing issue risk except for a break at rating scale 7 (Column 3, Table 8). The rating dummy coefficients are jointly and also individually positive significant except for rating scale 2. However, as seen earlier, the coefficients of rating dummies corresponding to adjacent rating scale values cannot be said to be significantly different – all tests of H_0:R(i-1)=R(i) are accepted with the sole exception of R7=R8. The role of issue maturity, issue size and issuer's relative assets as determinant of spread is insignificant as in case of Public banks. Thus, though the market disciplinary effect on SND issues by Private banks is relatively stronger, the market nevertheless fails to charge an adequately higher spread with every marginal increase in issue risk.

Column 4 in Table 8 presents the F-test results for equality of coefficients of Public and Private banks. The equality hypothesis is rejected for the rating dummies with the exception of R2. Considering the rating dummy coefficients of Private banks are uniformly higher, the rejection further strengthens the observation of *interest subsidy* enjoyed by the Public banks.

The fixed effect model estimates, presented in column 5 in Table 8, presents the *within* bank comparisons for the full set of banks. Fixed effects estimation is not performed for the sub-groups due to limitations in the number of observation. As earlier, no progressive rise in spread with lower issue risk rating is observed with the inclusion of unobserved bank specific factors. The results again fail to find support for a well performing market disciplinary effect on the SND issues. The issue of lower spread enjoyed by Public banks, however, finds further support. The F-test results in column 6 of Table 8 presents the coefficient equality test results for the OLS and FE estimations.

5.3 Time of Issue Effect on Spread:

Table 5 shows that out of the 203 SND issues over the last 10 years, more than half of the issues came up only in the period 2006-08. The data set is, therefore, divided into 2 subsets, one covering the period financial years 1999 to 2005 and the second 2006-08. This shall help to detect any change in the disciplinary activities by market participants in the SND market in recent times. The estimation is performed both with the full set of SND issues as well as including only those issues where the issuing bank have accessed the SND market in both the sub-periods. The results are presented in Table 9.

Column 1 in Table 9 presents the results for the period 1999-05. 66 out of 95 SND issues in the first sub-period are rated in the top 3 rating categories (23, 21 and 22 at scale 1, 2 and 3 respectively). Within these highly rated issues, those in rating scale 2 do not pay any higher spread relative to the highest rated issues. Except for R2, all other rating dummy coefficients are positive significant. The F-test (F(Ri)) also confirms their joint significance. The spreads show a stepwise increase with worsening issue risk profile, quite similar to earlier results. Only the hypotheses R2=R3, R3=R4 and R6=R7 can be rejected. The coefficients of R4, R5 and R6 are very close to each other and the hypothesis R4=R5=R6 cannot be rejected even at 10% level of significance. At the lower rating order, though individually R7=R8 and R8=R9 are accepted, the joint hypothesis R7=R8=R9 is rejected at 10% level of significance. This suggests that though lower issue rating entails higher spread in the first sub-period under study, the market fails to distinguish between closely rated SND issues and charge differential spread accordingly. A significant increase in spread is observed only with a substantial change in issue risk profile.

The ownership of the issuing bank has a significant effect on interest spread in the first sub-period too, with Public banks enjoying an *interest subsidy*. Issue maturity, size or, issuing banks' asset size though turns out to be insignificant determinants of spread. All the financial

Table 9: Time of Issue Effect on Spread

	All Banks			Common Banks Across Periods		
	1999-2005	**2006-2008**	**F-test**	**1999-2005**	**2006-2008**	**F-test**
Constant	260.60 ***	-107.60		165.23 **	-47.49	
	85.90	*90.78*		*69.27*	*100.11*	
R2	5.69	20.19 **	3.05 *	0.75	19.65 *	6.18 **
	8.30	*9.77*		*7.60*	*10.87*	
R3	20.23 ***	34.15 ***	3.09 *	25.57 ***	27.40 **	0.05
	7.92	*11.89*		*8.05*	*12.66*	
R4	63.38 ***	19.87	4.77 **	94.42 ***		
	19.92	*13.31*		*9.72*		
R5	61.61 ***	62.59 ***	0.00	70.68 ***	80.29 ***	0.23
	14.06	*18.16*		*19.94*	*15.45*	
R6	59.55 ***	109.45 ***	6.83 ***	92.18 ***	106.78 ***	0.38
	19.09	*18.86*		*23.77*	*20.77*	
R7	93.21 ***					
	10.73					
R8	106.86 ***	121.58 ***	1.29	122.81 ***	119.97 ***	0.05
	12.95	*12.77*		*12.57*	*13.05*	
R9	129.49 ***	121.73 ***	0.09	112.31 ***	115.87 ***	0.02
	26.22	*14.04*		*24.77*	*15.10*	
Maturity	-0.52	1.73	0.73	1.28	1.74	0.04
	2.62	*1.83*		*2.44*	*1.83*	
Issue Size	-3.93	13.51	2.82 *	3.64	6.71	0.14
	10.38	*9.84*		*8.09*	*10.83*	
Relative Asset	1.27	1.26	0.00	4.04	1.04	0.77
	6.68	*9.43*		*3.42*	*9.66*	
Ownership	-33.43 ***	-42.99 ***	0.59	-30.72 **	-31.69 **	0.01
	12.47	*12.54*		*12.40*	*13.95*	
FY01	-155.95 ***			-152.52 ***		
	14.84			*8.54*		
FY02	-67.82 ***			-88.38 ***		
	25.85			*17.30*		
FY03	-161.01 ***			-149.84 ***		
	13.58			*12.36*		
FY04	-169.81 ***			-165.45 ***		
	8.06			*6.90*		
FY05	-200.78 ***			-193.13 ***		
	8.50			*7.59*		
FY06						
FY07		47.23 ***			44.38 ***	
		9.90			*10.25*	
FY08		120.68 ***			112.73 ***	
		13.34			*16.15*	
N	95	108		80	92	
R²	0.82	0.63		0.84	0.59	
F	20.36 ***	12.29 ***		19.98 ***	9.36 ***	
F(Ri)	14.09 ***	40.96 ***		21.06 ***	17.73 ***	

*Note: (i) *, ** and *** indicate significance at 10%, 5% and 1% level respectively.*
(ii) The smaller figures in italics give the standard errors.

year dummies are significant. The joint significance of all the explanatory variables is also confirmed.

Column 2 in Table 9 presents the results for the second sub-period. The results of the second period follow a similar pattern as in the first. Except for a break at R4, the rating dummy coefficients increase (signifying higher spread) with lower issue rating, but the coefficients of adjacent rating classes are not all significantly different. Considering 96 out of 108 of the issues in the second sub-period are rated in the top 3 rating categories (40, 44 and 12 at scale 1, 2 and 3 respectively), the significance of both R2 and R3 (with R1 as base) is important. So is the observation that R2 and R3 coefficients in second sub-period are significantly higher than first sub-period. On the flip side, however, the coefficients of R2 and R3 are not significantly different. Public banks continue to enjoy an *interest subsidy* in the recent periods too. Issue maturity, size or, issuing banks' asset size remains insignificant determinants of spread.

The estimations for the individual sub-periods are repeated by excluding the banks with issues in only one of the sub-periods. This results in omission of 15 and 16 SND issues from first and second sub-period respectively. The results are presented in column 4 and 5 in Table 9. The results are similar to the full set of issues for both sub-periods.

In summary, the evidence for market discipline in either sub-period is quite weak. Even though there has been a proliferation of SND issues in the recent times, no evidence can be observed in favour of any significant increase in disciplinary role by market participants. Additionally, the *interest subsidy* enjoyed by the Public banks emerges as a common feature in both sub-periods.

5.4 Balance Sheet Variables as Determinant of Spread:

A number of balance sheet variables are also used as alternate predictors of SND issue spreads. The variables considered are Leverage, Return on Assets, Non-performing Assets, Capital Adequacy Ratio and Liquidity. The model is estimated for (i) full set of issues, (ii) each ownership based group and (iii) for the periods 1999-05 and 2006-08. Both OLS and FE estimate is obtained for only the full set of issues. The results are presented in Table 10.

The OLS results (Column 1-5, Table 10) for the full set of banks though look promising with 4 out of 5 balance sheet variables as well as the interactive term turning out to be significant, the results cannot be replicated consistently for any of the balance sheet variables for the ownership or, issue period based sub-groups. The indicators of profitability, asset quality and liquidity, whenever significant, have the expected signs - the issue spreads are lower for better performing banks. The banks with lower leverage and higher capitalisation though pay a higher spread. The accounting variables are, however, jointly significant in each of the models. Issue maturity and size remains insignificant for all OLS estimates. Only Private banks with higher relative (total) assets enjoy a significant lower spread. The only common result is the lower spread enjoyed by the Public banks.

The FE results for the full set of issues (Column 6, Table 10) are similar to OLS results. Only asset quality and liquidity remain significant determinant of issue spread. Relative stability of Return on Asset and Capital Adequacy Ratio *within* the issuing banks may be reason for their insignificance with the inclusion of bank specific unobserved factors. The insignificance of the ownership dummy can be due to the large number of banks dummies, which might have incorporated the ownership effect.

The results thus fail to confirm the accounting variables as a consistent and better proxy relative to issue ratings to measure risk sensitivity of the investors in the SND market.

Table 10: Balance Sheet Variables as Determinant of Spread

	OLS Estimator					Fixed Effect Estimator
	Full Set	**Public**	**Private**	**1999-2005**	**2006-2008**	**Full Set**
Constant	206.73 ***	211.39 *	1.53	367.95 ***	18.76	246.82 ***
	88.27	114.63	83.39	134.76	149.08	91.76
Leverage	-0.42	1.61	4.00	-3.32 *	-1.04	0.23
	1.33	1.95	2.95	1.94	3.19	1.40
Return on Asset	-79.57 ***	19.50	-14.13	-95.64 ***	-65.42	3.63
	18.33	38.13	40.18	28.20	47.27	32.79
RoA*LEV	3.06 ***	-1.23	0.02	4.64 ***	2.90	-0.31
	1.00	1.96	1.55	1.65	2.54	1.60
Non-performing Asset	4.85 **	1.93	10.56 ***	3.81	15.78	6.34 *
	2.20	1.78	2.41	4.40	6.07	3.50
Capital Adequacy Ratio	8.74 ***	3.69	7.22	6.80	1.49	-3.55
	2.47	2.43	4.98	4.16	4.07	3.02
Liquidity	-90.87 *	-123.83 **	55.17	-141.39	151.39	-132.79 *
	48.10	47.87	142.79	122.92	126.89	77.66
Maturity	-0.38	-0.19	-0.36	-1.75	1.35	2.26
	1.95	2.44	2.04	3.54	2.29	1.86
Issue Size	-0.05	-8.43	-0.15	-7.56	1.40	7.62
	7.26	7.84	7.31	11.81	8.98	8.16
Relative Asset	-6.66	6.42	-28.68 ***	-5.79	-8.56	-4.41
	9.19	4.33	6.33	10.13	10.91	10.47
Ownership	-86.21 ***			-82.20 ***	-62.14 ***	-17.45
	10.61			17.18	15.38	17.70
FY01	-156.92 ***	-154.07 ***		-144.51 ***		-150.57 ***
	18.23	30.32		29.31		14.59
FY02	-81.85 ***	-82.90 ***		-101.26 ***		-80.70 ***
	20.68	31.42		25.75		24.04
FY03	-111.09 ***	-144.14 ***		-126.21 ***		-173.01 ***
	19.79	29.19		31.48		20.86
FY04	-176.18 ***	-180.26 ***	-80.21 **	-187.14 ***		-207.97 ***
	11.82	27.16	34.43	28.26		16.88
FY05	-197.68 ***	-188.80 ***	-120.32 ***	-213.59 ***		-238.12 ***
	14.13	27.44	33.99	30.24		20.20
FY06	-188.31 ***	-185.01 ***	-80.74 **			-232.91 ***
	15.44	27.65	39.89			22.36
FY07	-127.66 ***	-124.03 ***	-16.70		66.00 ***	-189.55 ***
	16.46	28.38	43.01		12.50	25.50
FY08	-32.53 *	-67.77 **	101.18 **		146.17 ***	-102.83 ***
	18.11	32.87	39.28		23.04	30.07
N	203	108	95	80	91	203.00
R²	0.66	0.73	0.74	0.71	0.58	0.79
F	20.24 ***	14.23 ***	16.25 ***	10.62 ***	8.87 ***	10.10 ***
F (Acc. Var.)	11.82 ***	1.92 *	16.38 ***	5.48 ***	9.38 ***	1.88 *
F (Fixed Effect)						13.09 ***

Note: (i) *, ** and *** indicate significance at 10%, 5% and 1% level respectively.
(ii) The smaller figures in italics give the standard errors.

35

6. Summary, Conclusion and Policy Suggestions:

Descriptive analysis of the data on SND issues by the Indian banks show a significant issue clustering in the highest risk rating categories, both in terms of number and aggregate size of the issues. The SND issue market is dominated by the Public Sector Banks (PSB). This is expected given the dominance of the PSBs in the Indian banking scenario. Moreover, considering the rapid economic growth in recent times, the resultant increase in bank business and thus capital requirement, more of the SND issues have come up only in the recent times. Mean spread of PSB SND issues do not show any significant increase with worsening issue risk profile. Market disciplinary forces, even if active at the overall level, are thus significantly weaker for the PSBs. The spread on PSB SND issues are generally lower (except at the top most rating scale) than the Private banks' SND issues in corresponding risk rating scale. The mean/median rating of SND issues also show an improving trend with a corresponding fall in rating volatility in the recent times. Considering that SND issues by banks in the recent past (2003-04 to 2006-07) have not seen any major widespread rating upgrades, this can be said to suggest that the banks with better risk profile are finding it easier to access the market for new SND issues compared to the lesser banks.

The pooled-OLS analysis of impact of issue risk rating on issue spread suggests sort of equi-spread clustering along the rating scale giving rise to a *step-wise weakly monotonous* increase in spread with worsening issue risk profile. The investors somewhat fail to adequately distinguish between closely rated issues by charging additional (statistically significant) spread on marginally riskier issues, suggesting at best a weak market discipline. Even this weak pattern is no longer observed once the unobserved bank specific factors are taken into consideration by including bank dummies in the regression model.

Public banks enjoy a significant *interest subsidy* relative to their Private counterparts in the same issue rating scale, likely to be due to the *implicit government guarantee* to their solvency. The spread on PSB SND issues also do not increase significantly with worsening

issue rating, giving rise to the possibility that PSB SND issue spread is determined by extraneous factors and not by issue risk. The market disciplinary effect on Private banks though is relatively stronger, the market nevertheless fails to charge an adequately higher spread with every marginal increase in issue risk.

No evidence in favour of any significant strengthening of disciplinary forces in the recent times (2006-08) is observed even though there has been a proliferation of issues over this period. Disciplinary mechanism remains quite weak over the whole period studied. The *interest subsidy* enjoyed by the PSBs emerges as a common feature across both sub-periods. The results fail to confirm the bank specific accounting variables as a consistent and better proxy relative to issue ratings to measure risk sensitivity of the investors in the SND market.

In conclusion, the evidence of market discipline in Indian banking is rather weak. It needs to be noted here that market discipline works only for banks which have issued market traded securities. Additionally, there also should be a sufficient number of market participants to ensure market liquidity for the signals to be meaningful (Kwan, 2002a; Kwan, 2002b). Though the Indian banks are allowed to issue SND as part of regulatory capital, there is no mandatory obligation on the part of the Indian banks to hold a regulatory minimum of their capital in this form or, access the market at a certain frequency. As a result, not all Indian banks have issued SNDs and amount of issued SND varies greatly among those who have. Moreover, due to lack of a well developed debt market, there is hardly any secondary market trading. In this context, proposals of a mandatory subordinated debt programme (Evanoff *et al.*, 2007; Calomiris, 1997; Calomiris, 1999) with a prescribed minimum and regular roll-over can be considered. The financial authorities should also put more effort towards developing a vibrant secondary debt market. Otherwise, the effectiveness of debt holders as a disciplinary force will be grossly limited.

Since RBI has formally adopted the Basel II framework and accepted the role of market as a *pillar* for ensuring stability of the banking system, it should also earnestly start working

towards improving data base in terms of both details and depth, and also ensure easy public dissemination of such information. Another pre-requisite for market discipline to be effective is accuracy of the information. Even though RBI has taken effort to ensure conformity of the accounting policy of banks with the accounting standards issued by the Institute of Chartered Accountants of India (ICAI), a number of issues still remain.

With the enhanced role of Rating Agencies in the Basel II framework, adequate care should also be taken to preserve the integrity of agencies. Additionally, considering the level of public ownership of banks in India, popularising rating scales such as *Moody's Banks Financial Strength* and *FitchIBCA Individual* may be considered. These ratings differ from traditional ones in that they focus solely on a bank's economic and financial conditions and do not take into account any external support from banks' owners, state authorities, or other official institutions. Expanding the rating horizon by encouraging more "issuer" ratings to supplement the solely "issue" rating culture at present should also be looked into.

Last but not the least, more debates on the benefits vs. costs of having public ownership of banks need to be encouraged considering the detrimental effect of Government ownership on disciplinary performance of market agents.

References[*]

Ashcraft, A. B., 2006. Does the Market Discipline Banks? New Evidence from the Regulatory Capital Mix. *Federal Reserve Bank of New York Staff Report No. 244.* Available online at: http://ssrn.com/abstract=901805

Avery, R. B., Belton T. M., and Goldberg M. A., 1988. Market Discipline in Regulating Bank Risk: New Evidence from the Capital Markets. *Journal of Money, Credit, and Banking*, 20, 597-610.

Barth, J. R., Caprio G. Jr. and Levine R., 2004. Bank Supervision and Regulation: What Works Best? *Journal of Financial Intermediation* 13, 205-248.

Basel, 2001. Basel Working Paper on Pillar 3 - Market Discipline. Available online at: http://www.bis.org/publ/bcbs_wp7.htm

Beck, T., Demirgüç-Kunt A. and Levine R., 2003. Law, Endowments, and Finance. *Journal of Financial Economics* 70, 137-181.

Beighley, H.P., 1977. The Risk Perceptions of Bank Holding Company Debtholders. *Journal of Bank Research* 8, 85-93.

Benston, G. J., Eisenbeis, R. A., Horvitz, P. M., Kane, E. J. and Kaufman, G. G., 1986. *Perspectives on Safe and Sound Banking: Past, Present and Future*. MIT Press: Cambridge, MA.

Berger, A. N., 1991. Market Discipline in Banking. In: *Conference on Bank Structure and Competition*, 1-3 May, Federal Reserve Bank of Chicago: Chicago, 419-437.

Berger, A. N., Davies, S. M. and Flannery, M., 2000. Comparing Market and Supervisory Assessments of Bank Performance: Who Knows What When? *Journal of Money, Credit and Banking* 32, 641-667.

Bianchi, C., Hancock, D. and Kawano, L., 2005. Does Trading Frequency Affect Subordinated Debt Spreads? *FEDS Working Paper* No. 2005-08. Available at SSRN: http://ssrn.com/abstract=658282

Bliss, R. R., 2001. Market Discipline and Subordinated Debt: A Review of Some Salient Issues. Federal Reserve Bank of Chicago *Economic Perspectives* 25, 24-45.

Bliss, R. R. and Flannery, M. J., 2002. Market Discipline in the Governance of U.S. Bank Holding Companies: Monitoring vs. Influencing. *European Finance Review* 6, 361-395.

---

[*] All online resources last accessed as on 11th May, 2008.

Bruni, F. and Paterno, F., 1995. Market Discipline of Banks' Riskiness: A Study of Selected Issues. *Journal of Financial Services Research* 9, 303-325.

Caldwell, G., 2005. Subordinated Debt and Market Discipline in Canada. *Bank of Canada Working Paper 2005-40*. Available online at: http://dsp-psd.pwgsc.gc.ca/Collection/FB3-2-105-40E.pdf

Calomiris, C. W., 1999. Building an Incentive-Compatible Safety Net. *Journal of Banking and Finance* 23, 1499-1519.

Calomiris, C. W., 1997. *The Postmodern Bank Safety Net: Lessons from Developed and Developing Countries*. American Enterprise Institute: Washington, DC.

Calomiris, C. W. and Powell, A., 2000. Can Emerging Market Bank Regulators Establish Credible Market Discipline? The Case of Argentina, 1992-1999. *NBER Working Paper*, No. 7715. Available online at: http://www.nber.org/papers/w7715.pdf

Caprio, G. and Honohan P., 2004. Can the Unsophisticated Market Provide Discipline? *World Bank Policy Research Working Paper No. WPS 3364*. Available online at: http://go.worldbank.org/T2S0Q56PN0

Carlos, B. L. and Helmut, F. M., 2003. Market Discipline in Depositors' Behavior and the Role of Risk-Rating Agencies: The Case of Chile. *Economía Chilena* 6, 45-70.

Cooper, K. and Fraser, D. R., 1988. The Rising Cost of Bank Failures: A Proposed Solution. *Journal of Retail Banking* 10, 5-12.

Covitz, D. M. and Harrison, P., 2004. Do Banks Time Bond Issuance to Trigger Disclosure, Due Diligence, and Investor Scrutiny? *Journal of Financial Intermediation* 13, 299-323.

Covitz, D. M., Hancock D. and Kwast M., 2004. A Reconsideration of the Risk Sensitivity of U.S. Banking Organization Subordinated Debt Spreads: A Sample Selection Approach. Federal Reserve Bank of New York *Economic Policy Review* 10, 73-92. Available online at: http://www.newyorkfed.org/research/epr/04v10n2/0409Covi.pdf

Covitz, D. M., Hancock D. and Kwast M., 2000. Mandatory Subordinated Debt: Would Banks Face More Market Discipline? *Board of Governors of the Federal Reserve System*, unpublished paper.

De Young, R., Flannery, M. J., Lang, W. W. and Sorescu, S., 2001. The Information Content of Bank Exam Ratings and Subordinated Debt Prices. *Journal of Money, Credit and Banking* 33, 900-925.

De Young, R., Flannery, M. J., Lang, W. W. and Sorescu, S., 1998. The Informational Advantage of Specialized Monitors: The Case of Bank Examiners. *Federal Reserve Bank of Chicago Working Paper Series No. 98-4*. Available online at: http://www.chicagofed.org/publications/workingpapers/papers/wp98_4.pdf

Evanoff, D. D., 1993. Preferred Sources of Market Discipline. *Yale Journal on Regulation* 10, 347-67.

Evanoff, D. D. and Wall, L. D., 2002. Measures of the Riskiness of Bank Organizations: Subordinated Debt Yields, Risk Based Capital, and Examination Ratings. *Journal of Banking and Finance* 26, 989-1009.

Evanoff, D. D. and Wall, L. D., 2001. Sub-debt Yield Spreads as Bank Risk Measures. *Journal of Financial Services Research* 20, 121–145.

Evanoff, D. D., Jagtiani, J. and Nakata, T., 2007. The Potential Role of Subordinated Debt Programs in Enhancing Market Discipline in Banking. *Federal Reserve Bank of Kansas City Research Working Papers RWP-07-07*. Available online at: http://www.kansascityfed.org/Publicat/Reswkpap/PDF/RWP07-07.pdf

FDIC (Federal Deposit Insurance Corporation), 1983. *Deposit Insurance in a Changing Environment: A Study of the Current System of Deposit Insurance Pursuant to Section 712 of the Garn St Germain Depository Institutions Act of 1982, A Report to Congress on Deposit* Insurance, U.S. Government Printing Office: Washington, DC.

Flannery, M. J., 2001. The Faces of "Market Discipline". *Journal of Financial Services Research* 20, 107-119.

Flannery, M. J., 1998. Using Market Information in Prudential Bank Supervision: A Review of U.S. Empirical Evidence. *Journal of Money, Credit and Banking* 3, 273-305.

Flannery, M. J. and Sorescu, S. M., 1996. Evidence of Bank Market Discipline in Subordinated Debenture Yields: 1983-1991. *Journal of Finance* 51, 1347-1377.

Fraser, D. R., and McCormack, J. P., 1978. Large Bank Failures and Investor Risk Perceptions: Evidence from the Debt Market. *Journal of Financial and Quantitative Analysis* 13, 527-32 (1978).

Gorton, G., and Santomero, A. M., 1990. Market Discipline and Bank Subordinated Debt. *Journal of Money, Credit, and Banking* 22, 119-28 (1990).

Goyal, V. K., 2005. Market Discipline of Bank Risk: Evidence from Subordinated Debt Contracts. *Journal of Financial Intermediation* 14, 318–350.

Gropp, R., and Richards, A. J., 2001. Rating Agency Actions and the Pricing of Debt and Equity of European Banks: What We Can Infer About Private Sector Monitoring of Bank Soundness. *Economic Notes* 30, 373-398.

Hamalainen, P., 2004. Mandatory Subordinated Debt and the Corporate Governance of Banks. *Corporate Governance* 12, 93-106.

Hancock, D. and Kwast, M. L., 2001. Using Subordinated Debt to Monitor Bank Holding Companies: Is It Possible? *Journal of Financial Services Research* 20, 147-187.

Herzig-Marx, C., 1979. Modeling the Market for Bank Debt Capital. *Federal Reserve Bank of Chicago Staff Memorandum No. 79-5.*

Horvitz, P.M., 1986. Subordinated Debt Is Key to New Bank Capital Requirement. *American Banker* December 31, 5-6.

Iannotta, G., 2007. Market Discipline in the Banking Industry: Is there Anything Beyond Credit Ratings. *SDA Bocconi and Universita Luigi Bocconi Working Paper*. Available online at: http://ssrn.com/abstract=1030295

Jagtiani, J., Kaufman G., and Lemieux C., 1999. Do Markets Discipline Banks and Bank Holding Companies? Evidence from Debt Pricing. *Federal Reserve Bank of Chicago Working Paper S&R-99-3R*. Available online at: http://www.chicagofed.org/publications/publicpolicystudies/emergingissues/pdf/S&R-99-3R.pdf

Keehn, S., 1988. Banking on the Balance: Powers and the Safety Net, A Proposal. Federal Reserve Bank of Chicago *Economic Perspectives* 12, 17-32.

Kwan, S. H., 2002a. Bank Security Prices and Market Discipline. *Federal Reserve Bank of San Francisco Economic Letter No. 2002-37*. Available online at: http://www.frbsf.org/publications/economics/letter/2002/el2002-37.pdf

Kwan, S. H., 2002b. The promise and limits of market discipline in banking. *Federal Reserve Bank of San Francisco Economic Letter No. 2002-36*. Available online at: http://www.frbsf.org/publications/economics/letter/2002/el2002-36.pdf

Kwast, M. L. et al., 1999. Using Subordinated Debt as an Instrument of Market Discipline. *Board of Governors of the Federal Reserve System Staff Study No. 172*. Available online at: http://www.federalreserve.gov/pubs/staffstudies/172/ss172.pdf

Lang, W. W. and Robertson, D. D., 2000. A Retrospective Analysis of Subordinated Debt as a Trigger for Regulatory Intervention. *Manuscript, Office of the Comptroller of the Currency*.

Levonian, M., 2001. Subordinated Debt and the Quality of Market Discipline in Banking. *Presented at Research and Supervision: A Workshop on Applied Banking Research*, *Oslo, June 12-13*, Available online at: http://www.bis.org/bcbs/events/oslo/levonian.pdf

Litan, R.E., and Rauch, J., 1998. *American Finance for the 21st Century*. Brookings Institution Press: Washington DC.

Llewellyn, D. T., 2001. A Regulatory Regime for Financial Stability. *Austrian National Bank Working Paper Series* No. 48. Available online at: http://www.oenb.at/de/img/wp48_tcm14-6134.pdf

Merton, R., 1973. An Intertemporal Capital Asset Pricing Model. *Econometrica* 41, 867-887.

Meyer, L. H., 1999. Market Discipline as A Complement to Bank Supervision and Regulation. In: *Conference on Reforming Bank Capital Standards,* Council on Foreign Relations, New York, June 14.

Morgan, D. and Stiroh, K. J., 2001. Bond Market Discipline of Banks: The Asset Test. *Journal of Financial Services Research* 20, 195-208.

Pawaskar, V., Roy, S. D. and Darbha, G., 2002. The NSE-Government Securities Index: Issues in Construction. Available online at:
http://www.nseindia.com/content/debt/gsec_paper.pdf

Pettway, R. H., 1976. The Effects of Large Bank Failures upon Investors Risk Cognizance in the Commercial Banking Industry. *Journal of Financial and Quantitative Analysis* 11, 465-477.

Pop, A., 2006. Market Discipline in International Banking Regulation: Keeping the Playing Field Level. *Journal of Financial Stability* 2, 286–310.

Ramsey, I. B., 1969. Tests for Specification Errors in Classical Linear Least-squares Regression Analysis. *Journal of Royal Statistical Society Series B* 31, 535-552.

Schweitzer, R., Szewczyk, S. H. and Varma, R., 1992. Bond Rating Agencies and their Role in Bank Market Discipline. *Journal of Financial Services Research* 6, 249-263.

Sironi, A., 2003. Testing for Market Discipline in the European Banking Industry: Evidence from Subordinated Debt Issues. *Journal of Money, Credit and Banking* 35, 443-472.

Sironi, A., 2001. An Analysis of European Banks' SND Issues and its Implications for the Design of A Mandatory Subordinated Debt Policy. *Journal of Financial Services Research* 20, 233-266.

Wall, L.D., 1989. A Plan for Reducing Future Deposit Insurance Losses: Putable Subordinated Debt. Federal Reserve Bank of Atlanta *Economic Review* 74, 2-17.