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Indian Institute of Management Calcutta

Editorial

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The financial markets in India have been witnessing major turmoil thanks to an announcement by the Chairman, U.S Federal Reserve that the Fed may stop buying bonds and pumping in dollars. This announcement, which has not yet been implemented, has already created havoc in the financial markets of most of the emerging economies. The foreign institutional investors have started liquidating their investments in these economies and putting the money back to the U.S. bonds in view of higher expected yield. The recent foreign funds outflow from India and the weakening of the rupee show that volatility in our financial markets depend very much on these actors.

The first article in this volume, therefore, attempts to develop a sentiment index for FII flows into India. The article highlights that factors driving FII investments include domestic, U.S. and emerging market (Brazil) variables. The article surprisingly finds no relationship between the overall growth indicator (GDP) and FII flows. The second piece looks into possibilities of raising capital from abroad from the trends in "bank capital" from balance of payments statistics and speculates on some futuristic trends. The third article is on Indian bond market and the author shows how liquidity infusion by RBI helps banking system to invest in bonds thereby increasing and stabilizing the bond market turnover.

I hope you'll enjoy reading the newsletter. Please offer suggestions for further improvement to ashok@iimcal.ac.in

Editor

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Towards a sentiment index for foreign institutional investment

Prof. Ashok Banerjee & Samarpan Nawn (FP Student, IIM Calcutta)

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Foreign institutional investments have gradually become one of the most important factors driving economic growth, specifically in developing BRIC nations. Foreign investors are seen flocking with huge funds in search of excess stock market returns and bond market yield spread. While the global markets returns were very low in the recent past, emerging market returns have out-performed the markets of developed economies and this strategy of FIIs turns out to be profitable and prudent. When credit conditions decline, FII investors take the path of "flight to safety" and are seen making heavy sale transactions in order to come out of their emerging market exposures.

Foreign inflows in the Indian equity markets have crossed $15 billion by May this year. Bulk of this investment is triggered by the favourable liquidity position in the US and in Japan. The extent of FII contribution in Indian equity markets has been in the range of 25-40% for the last 5 years. A staggering figure, and enough to have a significant influence on the market returns. India, as an economy, faces huge current account deficit and needs capital account surplus to fund the deficit. The FII contribution becomes vitally important in this regard. Strong FII contributions bring in liquidity to Indian capital markets and reduce the cost of capital domestically. In the Indian context, empirically, FII's have been seen as fuelling equity market rallies or declines. In almost all cases of market rallies or declines, it is the FIIs who typically start the same by pumping in or taking out money profusely and then other investors follow suit.

However, recent announcements by the Federal Reserve in the US about the rollback of quantitative easing have already created panic in Indian markets. The Indian capital market has witnessed in June 2013 substantial outflows of FII funds. In June 2013 FIIs had made a net outflow of over ₹ 20,000 crore from the debt securities, after a net inflow of close to ₹ 25,000 crore in the first five months of 2013. In addition to creating havoc in the equity and debt markets, foreign outflows coupled with stiff crude and gold imports have severely weakened the Indian currency. The Indian Government is seized of the matter and is making efforts to attract foreign investments. There is no short-term solution in sight. There are two sure ways to attract more dollars to India- NRI remittances (which has been quite good in this year so far) and FDI (the Government is contemplating raising FDI limits in several sectors).

These overseas investors are a mix of foreign pension funds, insurance companies, mutual funds, hedge funds, exchange traded funds etc. But they lord over the equity trading in India through their holding of almost 19 per cent of the country's market capitalisation. More than a third of the daily turnover in the cash market and one-fifth of derivative turnover on the National Stock Exchange stems from FII transactions. Most of the reversal points in stock market in recent years have been accompanied by heavy buying or selling by this investor group. It has, therefore, become imperative for investors to understand the factors that drive the FII fund flows into our country to gauge the direction of the equity market. The factors which affect FII flows include domestic market as well as international variables. Surprisingly, FII inflows in India have very low correlation with overall economic development of the country (measured by GDP).

Sentiment Index

A sentiment Index is a numerical indicator designed to show how a group feels about the market, business environment or other factors. A sentiment indicator seeks to quantify how various factors, such as unemployment, inflation, macroeconomic conditions or politics influence future behaviour. Sentiment indicators can be used by investors to see how optimistic or pessimistic people are to current market

conditions. The U.S. Consumer confidence Index is an example of a well established sentiment index which is published regularly.

FII Sentiment Index for India
We have made an effort to build a prediction index by considering various macroeconomic and market variables. The goal of the index would be to predict the FII investor sentiment for the forthcoming month. This tool would be very useful for both policymakers and investors to gauge the FII activity for the coming month and act accordingly.

Methodology
We started with monthly FII data from January 2007 to April 2013. This data was readily available in SEBI website and we just added the buy side and sell side data to arrive at the gross FII participation for each month. We also considered data before 2007, but structurally the data was very different.

Table 1: Average monthly gross FII participation (in ₹Crores)

Year	Monthly FII data
2005	45367
2006	77394
2007	134306
2008	131307
2009	115082
2010	147135
2011	146706
2012	132393

Variable Selection
In any predictive analysis, the greatest challenge lies in identifying the relevant independent variables. The challenge here was even greater as we had to search not for concurrent indicators, but for leading indicators, which are much harder to find.

Our variables belonged to one of the following four classes:

Money Market variables (e.g., Domestic Call Rate – Repo Rate)

Bond Market variables (e.g., 5 Year AAA – GSEC Yield India, U.S 10 Year AAA Rate)

Forex Market variables (e.g., USDINR Rate)

Stock Market Variables (e.g., Nifty Return , S&P 500 Return)

We had identified about 100 independent variables and considered their individual correlations with dependent variable, the Gross FII participation (Called FII_GROSS from now on) . The ones with very low correlation were excluded from further analysis. E.g.,

3month – 10 year interest rate term structure for India (-2%)

Chinese Yen/USD exchange rate (0%)

Since the dependent variable was a time series, it was natural to consider it as a sum of trend, seasonality and cyclical components. The trend part was estimated by 3 month moving average. We looked at 2 month, 3 month and 4 month moving average of FII_GROSS for estimating the trend portion, but the 3 month average seemed to fit the data best. Also introduced seasonality variables but they turned out insignificant in this analysis. Time of the year did not seem to influence the FII activity. The relevant variables (out of 100 variables analysed) discussed above were used to estimate the cyclical component of the series.

The Model

After trying out various combinations we decided to stick to a model which is dependent on at least 5-6 variables and whose results hold in out of sample validation period. We also checked for the possible multicollinearity problems with Variance Inflation Factors (VIF) and the autocorrelation with Darbin-Watson (DW) Statistic. We next present our model output and associated results for out of sample validation.

Table 2: ANOVA Table and Regression output for chosen model

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	42614794588	7102465765	12.86	<.0001
Error	48	26514931736	552394411		
Corrected Total	54	69129726324			

Root MSE	23503	R-Square	0.6164
Dependent Mean	134633	Adj R-Sq	0.5685
Coeff Var	17.45718		

| Parameter Estimates						
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	-3043.0	49651.00	-0.06	0.9514	0
Commercial paper - T Bill	1	-3659.1	2803.26	-1.31	0.198	1.98085
Moving_AVG_3	1	0.5	0.14	3.9	0.0003	1.80985
Brazil_ETF_Return	1	75685.0	33457.00	2.26	0.0283	1.18026
TradingDays	1	4277.2	2278.80	1.88	0.0666	1.08433
India_1m_Realized_vol	1	-535.6	324.27	-1.65	0.1052	2.18532
IN____US_3mReal	1	229276.0	205886.00	1.11	0.271	1.96747

Results are reasonable in the sense that the model appears to be a good fit given higher R-squared value. The significant variables are- Trend, Brazil ETF returns, trading days in a month and market volatility. The significance of Brazil ETF returns is quite interesting as U.S investors view Brazil as another destination for emerging market investment purposes. The negative association between market volatility and FII flows is logical as these investments are in the cash segment of the market. There is no multicollinearity problem as only one of the VIF's is marginally greater than 2 and the others are less than

2. We used the out of sample data to compute the DW statistic and it turned out to be 1.7. So there is no autocorrelation problem as such.

Based on above results, we have constructed an FII sentiment index using August 2011 as the base month.

Table 3: Comparison of Actual FII flow and computed Index from August 2011

Month	Actual FII Flow	Index Values
08-2011	147082.9	100.0
09-2011	131603.2	93.8
10-2011	125743.2	78.6
11-2011	127855.6	102.0
12-2011	162167.1	91.7
01-2012	126767.9	94.5
02-2012	172040.1	100.5
03-2012	150802.3	105.0
04-2012	105746.9	88.6
05-2012	116377.7	100.1
06-2012	125769.7	86.4
07-2012	121375.1	89.0
08-2012	108832.4	93.8
09-2012	146055.1	89.2
10-2012	132257.3	92.9
11-2012	123760.5	91.9
12-2012	158932.1	96.1
01-2013	166547.8	109.1
02-2013	167017.5	101.4
03-2013	168653.2	101.7
04-2013	161658	101.1

Figure 1: Comparison of Actual FII flow and computed Index from August 2011
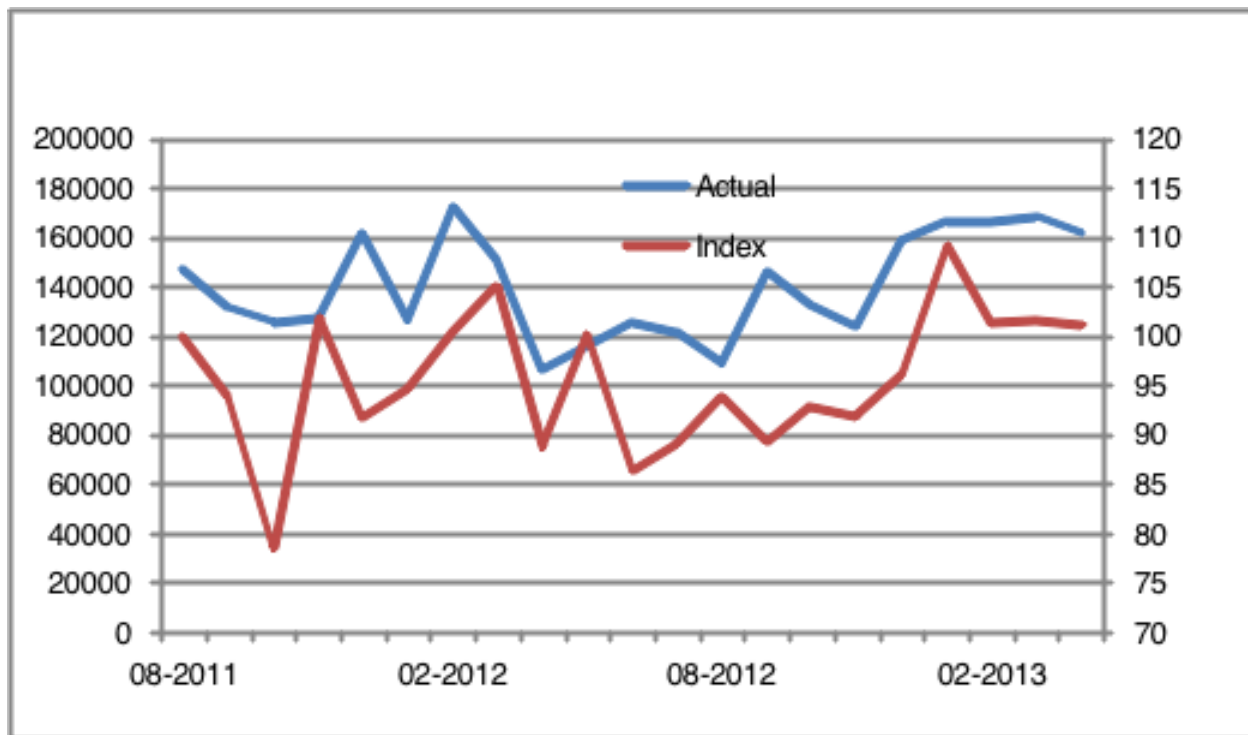
The correlation between the predicted index values and the actual FII flows has been quite satisfactory (see the diagram). The sentiment index provides a month-ahead sentiment. The index will be observed for next one year and if it is found that the index tracks the actual FII flows fairly well, we may call the constructed index a barometer of FII sentiment.

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Sourcing Banking Capital from Abroad: Trends and Future

Prof. Partha Ray

Partha Ray, Ph.D., is Professor, Economics, Indian Institute of Management Calcutta (IIM-C). Prior to joining IIM-C, Prof. Ray, a career central banker, was the adviser to Executive Director, International Monetary Fund, Washington D.C. during 2007-2011.

The fact that in the days to come bank capital needs to be significantly augmented is quite well-known. The pressure for increasing bank capital comes in the aftermath of the global financial crisis and emanates both from natural erosion of capital (arising out of holding of toxic assets by the banks) as well as newer regulatory regime. For example, under Basel III, capital requirement of banks is going to be significantly higher, *albeit* through a progressively gradual process. Indian banks cannot be exception to this general rule. The Economic Survey for 2012-13 of the Government of India noted, "though Indian banks remained well-capitalized, concerns regarding growing nonperforming assets (NPAs) persisted".

Such capital for the public sector banks can be raised from domestic and foreign sources. Admittedly, domestic sources for such bank capital could be from the government and private sources. However, there has been some tendency among Indian banks to source capital from abroad as well. In fact, "following the uncertainties prevailing in the domestic market and relatively subdued performance of the equity market during the first half of 2011-12, banks abstained from raising resources through public issues during 2011-12" (Economic Survey, 2012-13). Besides, during 2011-12, banks' resource mobilization through private placements also slowed down; private-sector banks, however, continued to raise resources through private placements. It is in this background the present column looks into possibilities of raising capital from abroad from the trends in "bank capital" from balance of payments statistics and speculates on some futuristic trends.

Definitional Issues

It will be apposite to clarify some definitional issues. As per the RBI's Balance of Payments compilation manual of the RBI, "banking capital", an item under capital account, comprises the following components:

- **foreign assets of commercial banks:** consisting of (i) foreign currency holdings, and (ii) rupee overdrafts to non-resident banks.
- **foreign liabilities of commercial banks:** consisting of (i) Non-resident deposits, and (ii) rupee and foreign currency liabilities to non-resident banks and official and semi-official institutions.
- **Others:** comprising movement in balances of foreign central banks and international institutions like IBRD, IDA, ADB, IFC, IFAD, etc., maintained with RBI as well as movement in balances held abroad by the embassies of India in London and Tokyo.

As far as bank capital is concerned, it is near impossible for the public sector banks to source equity (Tier I) capital from abroad. However, banks tend to access tier II capital from various sources. After all, tier II capital itself is an amorphous entity, comprising as diverse as items like undisclosed reserves, revaluation reserves, general provisions and loss reserves, hybrid capital instruments,

subordinated debt and investment reserve account.[1] Illustratively, under hybrid debt instruments items such as perpetual cumulative preference shares, redeemable non-cumulative preference shares, redeemable cumulative preference shares are all eligible as part of Upper Tier II Capital. Besides, subordinated debt in foreign currency can be raised by Indian banks subject to RBI approval.

Longer-term Trends

What has been the trend in banking capital raised abroad? Chart 1 plots the data culled out from the balance of payments statistics – both in absolute term (in US $ million) and as a percentage to aggregate capital account (primarily comprising foreign loans, foreign investment and banking capital). Interestingly, if one treats the crisis year of 2008-09 as an aberration, then banking capital tended to account for nearly one-fifth of the capital account and hovered between US $ 5 – 10 billion.

Chart 1: Behaviour of Banking Capital in BoP

Source: Calculated from RBI data
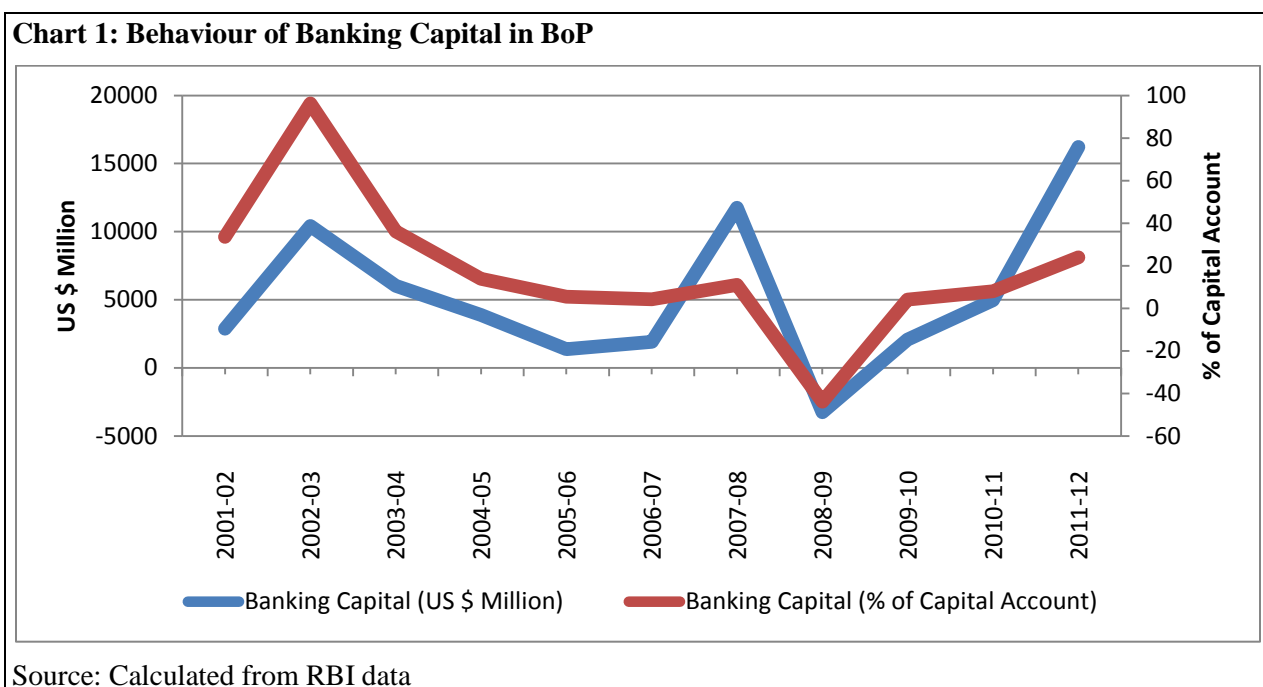
Of course, deposits of non-resident Indians explain a major chunk of such "bank capital" of balance of payments data (Table 1)

Table 1: Banking Capital and NRI Deposits (Net)
(US $ Million)

Item	2007-08	2008-09	2009-10	2010-11	2011-12	2011-12	2012-13 (Apr – Sept 2012)
Banking Capital	11,759	-3,245	2,083	4,962	16,226	19,714	1*-+4,899
Non-Resident Deposits	179	4,290	2,922	3,238	11,918	3,937	9,397

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[1] RBI (2012): "Master Circular - Prudential Norms on Capital Adequacy - Basel I Framework", July 2, 2012, available at http://rbidocs.rbi.org.in/rdocs/notification/

Recent Trends

So far Banks in India seem to be well-capitalized. Capital to Risk Weighted Assets of all types of commercial banks in India - public sector, private sector (both old and new), and foreign banks - are well above the statutory minimum rate of 9 percent (Chart 2).

Chart 2: Capital Positions of Banks in India

Source: Mohanty, Deepak (2013): "Perspectives on Banking in India", available at http://www.rbi.org.in
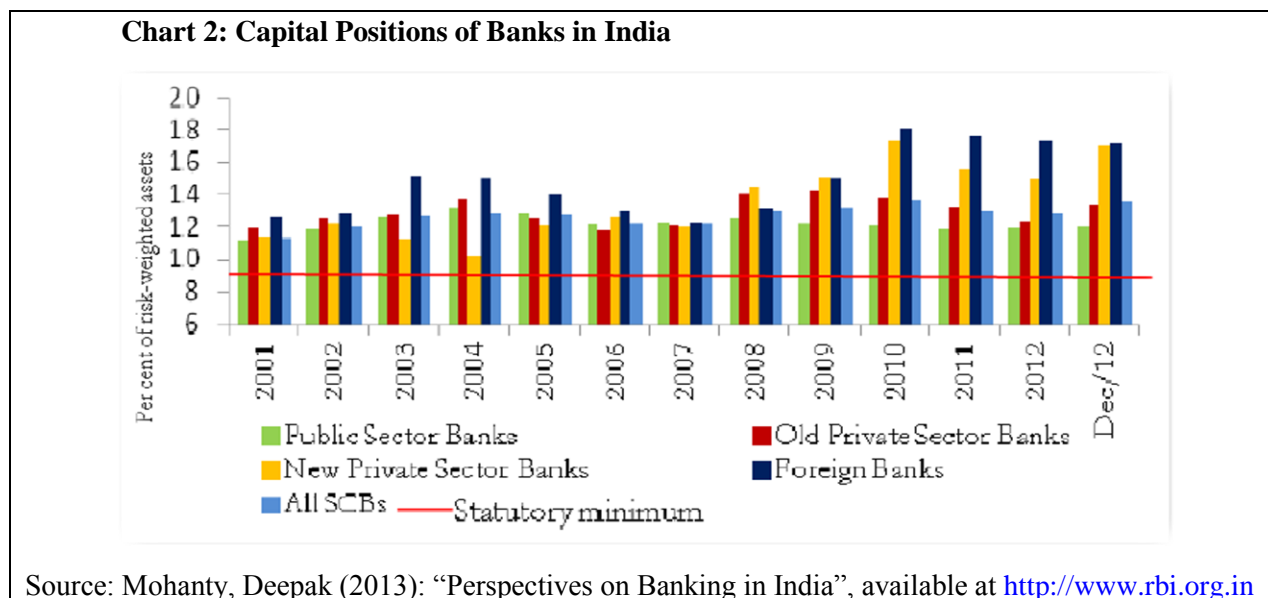
There are newspaper reports during that a number of banks are trying to tap global capital market to raise funds via bonds. Unconfirmed reports indicated that the Indian overseas Bank is planning to raise $500 million during the current financial year. The SBI too reportedly raised $1.25 billion through the issue of five-year overseas bonds. Similar amounts seemed to have been raised by the Exim Bank as well.

Interestingly, as per the latest BoP data (for the fourth quarter of 2012-13 as well as for the full year 2012-13), released on June 27, 2013, India's current account deficit (CAD) moderated sharply to 3.6 per cent of GDP in Q4 of 2012-13 from a historically high level of 6.7 per cent of GDP in Q3 of 2012-13. For the whole year 2012-13, along with an increasing trade deficit, decline in net invisible earnings and a modest rise in net services receipts led to widening of CAD to US$ 87.8 billion in 2012-13 (4.8 per cent of GDP as compared with 4.2 per cent last year). This current account deficit has been financed by increase in net inflows under financial account from about US$ 80.7 billion in 2011-12 to US$ 85.4 billion in 2012-13. Although net direct investment fell, capital inflows surged mainly on account of an increase in portfolio investment, non-resident deposits and short term credit and advances during this period. Thus, the trends in bank capital do not seem to have been affected substantially during 2012-13.

But the key question is how far are such activities of raising capital from the overseas market likely to get affected in the current turbulent forex market during 2013-14? In absence of firm data / indicator one can only be speculative in this context. Suffice to say the final impact will be shaped both by local and global factors. The net impact could be dictated by a confluence of happenings such as, euro-area uncertainties, continuation (?) of quantitative easing, exchange rate movements of the Indian rupee, interest rate regime in India vis-a-vis abroad, and actual reforms in the foreign investment regime.

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Indian Market Microstructure*

Dr. Golaka C. Nath

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Indian bond market is dominated by Government securities – in both primary and secondary markets. Government bond market includes the securities issued not only by the Government of India[2] but also the securities issued by various federal States. The primary market auctions for both Government securities and Treasury Bills are conducted through electronic auction system and the said system also facilitates "When Issued Market". The "When Issued Market" facilitates trading of a security before its issuance and helps the market to discover its price. It trades as a Forward for a maximum of about 4 days after the issuance of auction notice[3] till the auction day. It provides an opportunity for primary dealers to redistribute the stocks before participating in the auction.[4] This market allows short selling with various limits fixed by the RBI.

Table – 1: Snapshot of the Indian Government Securities Market					
	M[5]2009	M2010	M2011	M2012	M2013
No. of Outstanding stock	132	128	122	121	118
Outstanding stock (` In billion Face Value)	17,061	20,335	23,500	27,830	32,445
Outstanding stock as ratio of GDP (%)*	38.63	42.44	44.37	49.42	56.28
Turnover/GDP (%)*	468.66	628.68	418.02	391.23	629.64
Average maturity of the securities issued during the year (Years)	13.82	11.17	11.63	12.67	13.60
Weighted average cost of the securities issued during the year (%)	7.69	7.23	7.91	8.52	8.36
Minimum and maximum maturities of stock issued during the year (Years)	4 - 30	2 - 30	2 - 30	5 - 30	4 - 30
PD's share in the Outright turnover - Secondary Market	18.77	15.84	18.98	26.35	17.22
Transactions on CCIL (Face value ` In billion)#	62,545	89,867	69,702	72,521	119,948
Turnover Ratio (%)	0.9606	0.6188	0.6450	0.6641	1.7881
10-Year Yield (%)@	7.01	7.79	7.98	8.53	7.96
Outstanding Treasury Bills (` In billion)	1,503	1,375	1,413	2,670	2,998
Issuances of Cash Management Bills (` In billion)	-	-	120	930	-
91 Day T-bill cut-off Yield (%) $	4.95	4.38	7.31	9.02	8.19
Notes: * - GDP at market price (at 2004-05 prices). Q4 of 2012-13 is the approximation of Q3 with 5% p.a. GDP growth.					
# - Transaction on CCIL comprises of total outright and repo value settled.					
@ - Last trading day of the financial year.					
$ - Last Auction of the financial year. Turnover ratio is daily average trades volume divided by Face Value outstanding for Gilts					

Source: CCIL

*Personal views of the author and not the view of his organization

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[2] Securities issued by Government of India include T-Bills, dated coupon bearing securities, floating rate bonds, special securities.

[3] Auction Notices are typically issued by RBI on Mondays for an Auction on Fridays (standardized unless it falls on holidays and moves to previous day for Auction and next business day for Auction notice).

[4] Primary Dealers are required to underwrite the auction of Government Securities in India and receive fees for the same.

[5] March is the typical Financial Year End (FY 2011-12 mean Year ended March 2012).

During last few years, Government of India has been steadily increasing its market borrowing and funds almost 90% of its fiscal deficit through such market borrowings. In FY2011-12, large amount were raised by issuing T-bills of various durations. During FY2010-11 and FY2011-12, some Cash Management Bills[6] were also issued to raise funds from the system. As these large borrowings have put pressure in the market liquidity, RBI has to resort to Open Market Operations (OMO) on various occasions to infuse liquidity to the system. This liquidity infusion is in addition to the daily LAF Repo conducted by RBI to manage liquidity in the system.

Table -2: Government Borrowing Details (₹ Crore[7])						
FY	**G-Sec**		**SDL**		**T-Bill**	
	Gross	**Net**	**Gross**	**Net**	**Gross**	**Net**
2007-08	194050	146112	67779	56224	314496	-33155
2008-09	277000	219302	118138	103766	360912	31827
2009-10	428306	327369	131122	114883	385875	-13274
2010-11	437000	322677	104039	88398	343765	327
2011-12	510000	426025	158632	136643	630813	132193
2012-13	558000	467384	177279	146657	802830	32743

Source: CCIL

The high borrowing level has to be managed through uniform price based auctions[8] as well as through infusion of liquidity to the system. The liquidity shortage has been continuing for a long time in India (since July'10) and this has resulted in RBI injecting good amount of liquidity to the system using daily LAF. On some occasions, OMOs have to be conducted just before the auctions for Government securities. This has helped to ensure smooth sailing of auctions as well as helping to moderate yield.

Unlike US and other developed markets, Government bond market in India is a wholesale market with very little or negligible participation from retail investors[9]. The secondary market microstructure underwent dramatic change after introduction of structured clearing and settlement systems in Feb'02 and introduction of NDS-OM trading platform in Aug'05 which facilitated anonymous trading in Government bonds like equities with an efficient price discovery mechanism but without involvement of any intermediary. Brokers or intermediaries which facilitated about 80% of the trading before NDS-OM system did not have access to the new system and the new system was owned by Reserve Bank of India and directly allowed traders to trade accessing large market provided they have either Subsidiary Ledger Account (SGL) or Constituent Gilts Accounts[10]. The web-based application within NDS-OM system allows direct market access to constituents to trade in the wholesale institutional market with efficient price discovery. The participants had three options to choose: (a) directly negotiating with each other for a deal; (b) taking the help of a broker to identify the counter party to trade a security; (c) directly becoming a member of the new order driven system which was STP[11] enabled from the start. However, the new system captured about 60% of the market immediately after its introduction. The market share of the new trading system is steady at about 80%. Broking companies have very little role with about 8% market share. The NDS-OM system brought higher level of transparency to the market. In an OTC environment, information on market activity played very important role and smaller entities had very little bargaining

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[6] Unstructured short term T-Bills type instruments are issued to manage cash flow issues

[7] 1 crore is equivalent to 10 million.

[8] Before the onset of financial crisis, most of the auctions were price based (multiple price) auctions.

[9] RBI has provided for easy participation of retail investors by reserving 5% of the issue size for this category.

[10] SGL accounts are proprietary demat account of Banks and large institutions maintained with the RBI to hold Government securities while Constituent Gilt Account is an electronic demat account maintained by an investor with a service provider like a bank to hold the balances of Government securities once purchased.

[11] Straight Through Processing (STP) – a process through which a trade executed in the NDS-OM system will directly go for multilateral netting through the clearing house and final settlement in central bank money. Other deals have to be reported to RBI within a certain prescribed time after execution. Broker driven deals have to be reported by selling Bank to the RBI and Broker has also to report the same deal to the Stock Exchange.

power when striking a deal. These smaller entities depended heavily on the wisdom of brokers and other large traders. NDS-OM provided information of securities and the market activity on real time basis to all. Hence, trading securities becomes easier with people taking view on interest rate scenario rather than following their peers' activity in the market.

The new trading system, NDS-OM, provided higher liquidity to the system with an active order book management system and efficiency in price discovery. The traders could see the depth of the market anytime with buy and sell orders coming to the system with time stamp. Proprietary deals by Banks and Institutions accounted for about 87% in terms of value (90% in terms of number of deals). Participation in trading was also linked to a bank's total holding of Government securities. Typically a major part of a bank's holding of Government securities is in Held to Maturity (HTM) category as banks are allowed to put a part of the security (currently upto 25% of the Net Demand and Term Liabilities (NDTL) while Statutory Liquidity Ratio (SLR) has been brought down to 23% of NDTL[12]. Holding in the said category does not envisage any provision for mark-to-market losses as it is expected to be held till its redemption. The remaining part of the securities holding balance can be held in Available for Sale or Held for Trading which will require regular provisioning and mark-to-market.

Table – 3: Descriptive Statistics of Indian Government Bond Market											
	Volume Amount in ` crores				3 Months Yield (%)			10 Year Yield (%)			
Year	No of trades	Volume	Avg. Trades	Avg. Volume	Average	Minimum	Maximum	Average	Minimum	Maximum	Spread % (10Y – 3M)
2002-03	191,843	1,076,147	646	3,623	5.9813	5.1917	8.0806	7.0501	5.8493	8.4697	1.0687
2003-04	243,585	1,575,133	820	5,303	5.0302	4.3606	6.9191	5.6381	5.1037	6.4264	0.6080
2004-05	160,682	1,134,222	550	3,884	4.9433	4.2186	6.0219	6.4411	5.2346	7.3300	1.4979
2005-06	125,509	864,751	467	3,215	5.4102	4.8806	6.4624	7.2099	6.8800	7.5500	1.7998
2006-07	137,100	1,021,536	562	4,187	6.2781	5.1527	7.3844	7.8410	7.3685	8.4699	1.5629
2007-08	188,843	1,653,851	765	6,696	6.6016	5.1327	7.5067	7.9436	7.3880	8.3657	1.3419
2008-09	245,964	2,160,233	1,047	9,192	6.6021	3.7268	8.8655	7.8347	5.5200	9.4591	1.2326
2009-10	316,956	2,913,890	1,332	12,243	3.5714	3.1124	4.5022	7.7447	6.7102	8.2553	4.1733
2010-11	332,540	2,870,952	1,346	11,623	5.7268	3.1328	6.9313	8.0827	7.7530	8.3197	2.3559
2011-12	412,266	3,488,203	1,732	14,656	8.1514	6.6040	8.9539	8.3410	8.0600	8.9300	0.1896
2012-13	658055	6,592,032	2731	27353	8.0608	7.8055	8.6757	8.1543	7.7924	8.5600	0.0935

Source: CCIL

Banks alone account for about 72%[13] of total trading in Government securities while Primary Dealers account for about 17% and other Institutions like Mutual Funds and Insurance companies account for about 9% of trading. Indian Government bond market is divided into two distinct systems – (i) an anonymous order driven system (NDS-OM) and (ii) a trade reporting system where trades are executed

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12 As per the RBI guidelines of May'13, the total SLR securities held in the HTM category is not more than 24.50 per cent by end June 2013, 24.00 per cent by end September 2013, 23.50 per cent by end December 2013, and 23.00 per cent by end March 2014 of their NDTL as on the last Friday of the second preceding fortnight.
[13] As of Dec'12 statistics.

over phone by market participants and then reported to the central server of Reserve Bank of India (RBI) within a particular time frame[14]. Market participants, mainly institutions, are free to choose any of the above two systems. The NDS-OM system contributes a significant part of the market transactions in number of deals as well in terms of value of deals and has established itself as the most preferred platform for executing trades.

	Trades in NDS (%)	Value in NDS (%)	Trades in NDS-OM (%)	Value in NDS-OM(%)
Table 4: Market Share of Trading Platforms				
2005-06	50.36	56.98	49.64	43.02
2006-07	25.79	36.11	74.21	63.89
2007-08	16.43	27.42	83.57	72.58
2008-09	14.35	28.36	85.65	71.64
2009-10	12.87	27.41	87.13	72.59
2010-11	12.85	21.73	87.15	78.27
2011-12	10.89	20.96	89.11	79.04
2012-13	8.79	17.91	91.21	82.09

Source: CCIL

Some Stylized Facts

Liquidity Infusion

Liquidity in the market depends on many factors. The most important issue in liquidity is the support from the central bank to the banking system to access liquidity. RBI uses daily Liquidity Adjustment Facility (LAF) to moderate money supply in the system – if the banking system has excess liquidity, it can be parked at the central bank with a fixed return using policy reverse repo rate through LAF and if the banking system faces shortage of liquidity, RBI injects liquidity to the system using a fixed policy repo rate through LAF. In case the bank is not able to cover its position and still faces shortage, RBI supports the bank with a Marginal Standing Facility using a special LAF window at the end of the business day. The net LAF indicates the liquidity condition in the market. During financial crisis period, we find that liquidity shortage in the market resulted in RBI injecting funds to the system in mid-2008 and in Sep-Oct'08, the shortage was more than 1% of the NDTL. Further, in order to contain the impact of the financial crisis, RBI reduced the policy Repo Rate on multiple occasions, reduced CRR and SLR and infused liquidity to the system. This substantial injection of liquidity resulted in excess funds with the banking system as credit growth moderated due to the crisis. Banks started parking these excess funds with RBI at policy reverse repo rate. The liquidity infusion helped the market to increase their participation in bond market as interest rate started dipping due to infusion of huge liquidity to the system coupled with reduction in policy rates and drop in credit delivery.

Table 5: Actual/Potential Release of Primary Liquidity	
(since mid-September 2008 (till Mar 2009))	
Measure/Facility	Amount (`. Crore)
Monetary Policy Operations (1 to 3)	
1. Cash Reserve Ratio (CRR) Reduction	1,60,000
2.Open Market Operations	68,835
3. MSS Unwinding/De-sequestering	97,781
Extension of Liquidity Facilities (4 to 8)	
4. Term Repo Facility	60,000

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[14] Since April'13, all OTC deals executed by market participants need to be reported to the NDS-OM system.

5. Increase in Export Credit Refinance	25,512
6. Special Refinance Facility for SCBs (Non-RRB)	38,500
7. Refinance Facility for SIDBI/NHB/EXIM Bank	16,000
8. Liquidity Facility for NBFCs through SPV	25,000
Total (1 to 8)	4,91,628
Memo:	
Statutory Liquidity Ratio (SLR) Reduction	40,000

Source: RBI

The liquidity infusion also helps banking system to invest in bonds thereby increasing the bond turnover in the market. Since mid-2010, Indian market is going through a tight liquidity condition for which RBI has been injecting liquidity through LAF repo window and occasional OMO. The proactive policy initiatives were taken by RBI to avoid contraction of the RBI balance sheet and the same aimed at ensuring non-inflationary growth of money supply in the economy to support the needs of the real economy. This resulted in stabilizing the bond market turnover.

Table 6: Average LAF Support as a percentage of NDTL[15]									
Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
LAF	0.92%	0.90%	0.10%	-0.11%	2.23%	-0.13%	-1.12%	-1.44%	-1.49%
TR[16]	0.53	0.63	0.70	1.05	1.22	0.97	0.84	1.30	2.34

Source: CCIL, RBI

Trading Activity
Though there are large number of securities (there are 110 securities including special securities but excluding floating rate bonds as on March'13) extending maturity upto 30 years issued by the Government and available for trading in the market, trading is concentrated on a few securities. Indian Government bond market faces high concentration in benchmark securities like 10-year and 5-year maturities. Though there are large number of securities issued by the Government, trading in 10 securities constitute about 95% of the trading in terms of value. Hence most of the securities are relatively illiquid. Trading level in the market is also sensitive to the net LAF level. The correlation between Net LAF (as a percentage to NDTL) and average Trading volume is -0.33[17]. There is liquidity concentration in few securities like 10-year benchmark. The concentration of liquidity in few securities has increased in recent years.

Table -7: Liquidity Concentration (in %)		
Financial Year	Top 5	Top 10
2003-04	39.01	57.30
2004-05	49.97	66.31
2005-06	63.75	82.82
2006-07	74.88	88.82
2007-08	66.35	83.84
2008-09	61.07	73.89
2009-10	60.71	79.08
2010-11	71.77	88.03
2011-12	85.51	94.15
2012-13	77.05	95.05

Source: CCIL

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[15] Negative indicates RBI infusing money to the system through LAF window against eligible SLR securities

[16] Turnover Ratio (TR) is the average daily trading in Government securities as a proportion to the outstanding Face Value of Issuance.

[17] Higher net LAF indicates lower trading volume. Higher net LAF implies systemic liquidity issues (either banks are parking excess funds with RBI or Banks are borrowing funds from RBI) and hence banks do not typically use the funds of the LAF window for arbitraging in the bond market by taking position in Government stocks. Correlation was tested for the period April'05 to Mar'13.

Trading concentration in benchmark securities has been hallmark of the Indian Government securities market. After the financial crisis, market interest in long term bonds have come down significantly.

Category	M2003	M2004	M2005	M2006	M2007	M2008	M2009	M2010	M2011	M2012	M2013	Current
Table – 8: Maturity Bucket Trading Distribution												
upto 5 Years	7.08	9.07	23.64	26.44	27.68	22.81	19.46	27.15	19.57	3.49	6.81	15.29
5 to 10 Years	54.42	36.75	45.05	29.10	58.61	53.08	54.43	59.07	39.68	75.19	41.22	34.95
10 to 20 Years	35.54	52.53	29.35	39.78	4.62	8.88	13.69	11.58	39.20	20.34	49.81	48.53
20 to 30 Years	2.96	1.65	1.95	4.68	9.09	15.24	12.41	2.21	1.55	0.98	2.16	1.22

Source: CCIL

Liquidity Indicators

Few liquidity indicators like Turnover Ratio (TR), Amihud Illiquidity Indicator (AI), Impact Cost (IC) are widely used in the financial markets to understand the trend in liquidity behavior of tradable assets. We have used these indicators to understand the time series behavior. We have computed a long time series for these variables depending on availability of data. However, common data set was available for all 4 time series for a period of 78 months (Aug'06 to Feb'13). We have computed their monthly changes to understand their relationship with yield as yield is the most important parameter through which traders give their reaction and signal expected future interest rate that incorporates future inflation expectation. If yield is low, liquidity is high as it attracts traders to take exposure / positions in the market. Distribution of these variables is given in Annexure-1.

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Kolmogorov-Smirnov[18]
Table 9: - Descriptive Statistics of Parameters (Yield, Turnover Ratio, Amihud ILLIQ Indicator, Impact Cost)							
DY[19]	78	-0.0006	0.0339	-0.0443	-0.1733	0.0870	<0.010
DTR[20]	78	0.0131	0.3804	1.0226	-0.6999	0.7586	0.0130
DN[21]	78	-0.0027	0.4188	-0.2099	-0.9925	0.7656	>0.150
DIC[22]	78	-0.0007	0.3845	-0.0570	-1.6008	0.8043	>0.150

These variables have some explanatory power as these are outcomes of the market participants' reaction to changes in the market conditions for various reasons including policy changes. We find that Yield is negatively related to Turnover Ratio (higher yield means low turnover); Yield is negatively related to Amihud Illiquidity Indicator (higher yield means lower liquidity); Yield is positively related to Impact Cost (indicating high yield means high liquidity cost).

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[18] The test is used for testing Normality (if the p-value is less than say 0.10, the normality is rejected). Because the p-values for DN and DIC are all greater than 0.15, the hypothesis of normality is not rejected for these variables.
[19] Log returns of the daily Yields (computed on monthly basis)
[20] Log returns of daily Turnover Ratio (computed on monthly basis)
[21] Log return of daily Amihud Illiquidity Indicator(computed on monthly basis)
[22] Log return of daily Impact Cost (computed on monthly basis)

Table 10: Pearson Correlation Coefficients, N = 78				
Prob > |r| under H0: Rho=0				
	DY	DTR	DN	DIC
DY	1	-0.39413	-0.32059	0.10106
		0.0004	0.0042	0.3787
DTR	-0.39413	1	0.20386	-0.15759
	0.0004		0.0734	0.1682
DN	-0.32059	0.20386	1	0.30124
	0.0042	0.0734		0.0074
DIC	0.10106	-0.15759	0.30124	1
	0.3787	0.1682	0.0074	

However, the relationship between Yield and Impact Cost (IC) is not statistically significant. Relationship between various liquidity indicators also shows that these variables are useful tools to understand liquidity issues. Relationship between TR and AI is not very strong and only significant at 10% level while relationship between TR and IC is not significant. However, the relationship between AI and IC is positive and statistically significant at 1% level.

Financial Crisis and Liquidity

During financial crisis period, all markets faced severe liquidity crunch and central banks around the world started pumping liquidity to the banking and near-banking system against eligible collaterals. We explored to identify if financial crisis has affected any of these liquidity indicators using a dummy variable (Jun'2008 to Oct'09 was considered as the period of financial crisis for India depending on various policy dynamics). We used dummy variable for testing the impact of financial crisis on liquidity parameters. We did not find any statistical significance for the dummy variables in all three cases. This may be possible due to sufficient liquidity injection by the RBI through various measures which helped the market to maintain stability.

Table – 11: Parameter Estimates TR					
Variable	DF	Estimate	Standard Error	t Value	Approx Pr > |t|
Intercept	1	0.0184	0.0507	0.36	0.7174
DUMMY	1	-0.0147	0.112	-0.13	0.896
DY	1	-0.7284	0.1752	-4.16	<.0001
0.19, DW - 2.40					

For Turnover Ratio and Amihud Illiq Indicator, the dummy variable for financial crisis was not found to be statistically significant. This may be possible due to the requisite liquidity support to the system from RBI to ensure the market remain stable during financial crisis period and aftermath.

Table – 12: Parameter Estimates AI					
Variable	DF	Estimate	Standard Error	t Value	Approx Pr > |t|
Intercept	1	0.0014	0.0128	0.1100	0.9149
DUMMY	1	-0.0125	0.0283	-0.4400	0.6589
DY	1	-0.2002	0.0442	-4.52	<.0001
R-Sq - 0.21, DW - 2.61					

Table – 13: Parameter Estimates IC					
Variable	**DF**	**Estimate**	**Standard Error**	**t Value**	**Approx Pr > |t|**
Intercept	1	-0.2114	0.6515	-0.32	0.7465
DY	1	2.4154	2.2522	1.07	0.2869
DUMMY	1	1.0681	1.4399	0.74	0.4605
R-Sq - 0.02, DW - 2.55					

For Impact Cost, the dummy variable for financial crisis was also not found to be statistically significant.

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