Sensitive Sector Elasticity of incremental GNPA of Indian banks - An empirical assessment

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Abstract: *Reserve Bank of India has stipulated exposure norms and appropriate risk weights for banks in India.Bank exposure to certain sectors need to be carefully managed and monitored regularly in view of stability of the financial system.Study of credit allocation and sectoral or geographic distribution of bank credit provides an understanding of the contribution of bank credit towards economic growth and financial inclusion as well as its role in maintaining financial stability. Three sectors viz real estate, capital markets and commodities have been classified under the head of 'Sensitive Sectors' for banks. These sectors have been deemed to be sensitive for the stability of banks considering the (often violent) price fluctuations in the underlying asset/ product markets. Accordingly, banks exposures to sensitive sectors presumes significance in the context of financial stability as underlying assets in these sectors are subject to fluctuations in prices, and as such leads to booms in loans and advances. This paper makes an empirical assessment of the addition to NPA in banks based on their exposure to sensitive sectors. Using data for the period of 2002 to 2016 for 46 Scheduled Commercial Banks operating in India during the period, with the help of linear regression, we find evidence of significant relationship between incremental NPA and bank exposure to sensitive sectors.*
We suggest steps to look into this in order to maintain the financial health of the banks and the overall financial system in the country

Keywords: *NPA, Sensitive Sector Exposure of Banks, PSU Banks, Private Sector Banks, Scheduled Commercial Banks*

I. Introduction

In an undated note from RBI on Risk Management Framework in Banks, RBI has stated that banks and financial institutions play an extremely significant role in economic development. Due to their size of operations and accumulated knowledge, banks can handle multiple risk scenarios. Banks are exposed to various financial and non-financial risks which are interdependent and if the situation is not handled well, bank health problems can quickly transfer from one entity to another. Thus, bank top management should give an appropriate weightage and importance to the ability to identify, measure, monitor and control the overall level of risks facing the bank. Bank's exposure limits to sensitive sectors thus necessarily need to be monitored and restricted when required. Banks should aim to back up exposures by adequate collaterals or strategic considerations. RBI has stipulated prudential limits on exposure to sensitive sectors. In case of capital market exposure, the ceiling would cover (i) direct investment in equity shares and convertible bonds and debentures; (ii) advances against shares to individuals for investment in equity shares (including IPOs), bonds and debentures, units of equity oriented mutual funds; and (iii) secured and unsecured advances to stock brokers and guarantees issued on behalf of stock brokers. Banks are expected to regularly report to its Board about exposures of a bank to stockbrokers and market-makers as a group, as also exposures to other sensitive sectors.The Reserve Bank has been adopting a gradual approach to enhanced transparency in banking organisations. Over a period of time, the set of disclosures has gradually been expanded to encompass important information including lending to sensitive sectors (viz., capital market, real estate and commodities). The gradual expansion of the range of disclosures has been bringing the disclosure standards in India at par with those prevalent internationally. The disclosures of progress made towards establishing progressive risk management system, the risk management policy, strategy, exposures to related entities, the asset classification of such lendings/investments etc. should be in conformity with corporate governance standards, etc.

The demand for housing in India is strong, as is the case with most economies, which are now industrialising and urbanising rapidly. Besides, construction has significant forward and backward linkages with a number of other industries. However, it must be recognised that bank lending to potential home-owners in the Indian case is fundamentally different from the speculation in the property prices by banks in many countries. Importantly, the housing sector provides a relatively safe destination for bank credit on account of the lower than average rates of default. Besides, there is, an overall cap on the bank lending to sensitive sectors, including real estate.

II. Literature Review

RBI – Report on Trends and Progress in Banking (RTPB) states that excessive exposure to sensitive sectors can derail financial stability by making banks' operations vulnerable to the vicissitudes of a particular sector. Keeping this in view, the Reserve Bank has prescribed regulatory limits on banks' exposure to individual and group borrowers and the capital market to avoid concentration of credit. However, a close watch is maintained on exposures to other sensitive sectors such as housing and realty loans. The stability of a financial system stands enhanced when institutions and markets function on the basis of informed decisions. Adequate disclosures act as a deterrent to excessive risk taking and minimise adverse selection and moral hazard problems. Market discipline is known to increase with interest from outside stakeholders, viz., depositors, creditors and investors. It is, therefore, desirable that stakeholders have adequate information to be able to independently monitor the institutions. Transparency in operations can go a long way in strengthening market discipline. It is now widely perceived that greater market discipline is an important ingredient in the pursuit of financial stability. Detailed guidelines have been issued from time to time to ensure banks' compliance with the accounting standards issued by the Institute of Chartered Accountants of India (ICAI). The Reserve Bank in its Annual Policy Statement for 2008-09 had advised banks to exercise caution while extending advances to traders in agricultural commodities to ensure that bank finance was not used for hoarding.Further, regular monitoring of banks' exposure to sensitive sectors and their liquidity position is also undertaken. Banks were required to put in place appropriate stress test policies and relevant stress test frameworks for various risk factors by March 31, 2008.Through pre-emptive countercyclical provisioning and a differentiated risk weight stipulation for 'sensitive sectors', the adverse impact of high credit growth in some sectors and asset price fluctuations on banks' balance sheets were contained. In the light of the strong growth of consumer credit and the volatility in the capital markets, the risk weight for consumer credit and capital market exposures was raised from 100 per cent to 125 per cent.

Banking regulators worldwide generally use regulatory tools to strengthen the financial health of individual institutions, while monetary tools such as interest rates and reserve requirements are mainly useful in influencing the overall liquidity in the system. In India, since April 2005, the Reserve Bank has been expressing concern about the strong credit growth. Several monetary and prudential measures were initiated during this period. Two of the most commonly used regulatory tools were the risk weights used for calculating minimum regulatory capital and the provisioning requirements applicable to the standard assets. Generally, risk weights are dependent upon historic probability of default. However, unusually high credit growth in a sensitive sector can be seen as a precursor to higher default rates in future necessitating application of higher risk weights without waiting for the relative portfolio to show weaknesses.The continued rapid expansion in credit to the capital market prompted the Reserve Bank to increase the risk weight on banks' exposure to the capital market to 125 per cent in July 2005. The risk weight on commercial real estate exposure was increased from 100 per cent to 125 per cent in July 2005 and subsequently to 150 per cent in May 2006. The real estate loans showed deceleration thereafter, though in absolute terms there has been substantial increase. Thus, the higher risk weight applicable to this sector has been found to be an effective tool for moderating credit growth, besides serving prudential purpose.

The general provisioning requirement on standard advances in certain sectors, viz., capital market exposure, residential housing loans beyond Rs.20 lakh and commercial real estate loans was raised from 0.4 per cent to 1.0 per cent in May 2006, in order to ensure that asset quality was maintained in the face of high credit growth. As continued high credit growth in the real estate and capital market sectors emerged as a matter of concern, it was decided to increase the provisioning requirement in respect of standard assets for these loans and advances from 1.0 per cent to 2.0 per cent in January 2007. In view of the macroeconomic, monetary and credit conditions prevailing in November 2008, consistent with the practice of dynamic provisioning, the provisioning requirement for all types of standard assets was reduced to a uniform level of 0.4 per cent, except in case of direct advances to the agricultural and SME sectors, provisioning for which was retained at 0.25 per cent.The risk weight measure has also been used to enhance credit flow to socially important sectors such as housing finance, education loans and investments in mortgage backed securities of HFCs. The use of regulatory tools has helped in containing the growth of lending of SCBs to sensitive sectors. Thus, there has been some rebalancing and overall correction in credit growth in response to policy initiatives.Reports on Trends and Progress in Banking - In the past, growth in credit to sensitive sectors – namely, real estate, capital market and commodities – generally followed a pattern similar to the growth in overall credit however, in 2012-13, growth in credit to sensitive sectors almost doubled primarily on account of credit to real estate. This can be partly explained by the steep rise in housing prices in all Tier I cities and several Tier II cities in 2012-13.Reddy (2002), stated that bank exposures to sensitive sectors such as equity and real estate have been curtailed. Keeping in line with the merging regulatory and supervisory standards at international level, the RBI has initiated certain macro level monitoring techniques to assess the true health of the supervised institutions. To bring about greater

transparency in banks' published accounts, the RBI has also directed the banks to disclose data including that on lending to sensitive sectors. These proposed additional disclosure norms would bring the disclosure standards almost on par with the international best practice. It would be desirable if the exposures of a bank to stockbrokers and market-makers as a group, as also exposures to other sensitive sectors, viz., real estate etc. are reported to the Board regularly. The disclosures in respect of the progress made in putting in place a progressive risk management system, the risk management policy, strategy followed by the bank, exposures to related entities, the asset classification of such lendings/investments etc. conformity with Corporate Governance Standards etc., be made by banks to the Board of Directors at regular intervals as prescribed.

Shodhganga (Chapter VIII) states that RBI treats real estates as a "sensitive sector" to which banks should not have high exposure. The two other sensitive sectors are the capital market and big non-banking finance companies who normally borrow funds from banks and or further lend them to brokers in the form of margin financing for their stock market play. Exposure to sensitive sectors such as real estate, capital market & commodities sector need to be kept under constant watch and to be adequately disclosed in the balance sheet of banks.PSBs lend to sensitive sectors such as the commodities, the real estate and the capital market. Commodities include cash crops, edible oils, agricultural products and other sensitive commodities. While, the sum total of such lending is still small, there are some segments of the banking sector, especially the old and new private sector banks that are characterized on average by a much higher degree of such exposure.RBI Monthly Economic Review (2006) stated that since the beginning of 2006, the RBI seems to be keeping a close watch on banks' lending to the sensitive sectors, especially real estate and capital market. It is reported that the banks have similarly expanded their exposures this year too and hence the RBI has been cautioning them.

RBI MC – Exposure Norms stipulate that banks should frame comprehensive prudential norms relating to the ceiling on the total amount of real estate loans, single/group exposure limits for such loans, margins, security, repayment schedule and availability of supplementary finance and the policy should be approved by the banks' Boards. Prudential capital market exposure norms prescribed for banks were rationalized in terms of base and coverage. The revised guidelines, which came into effect from April 1, 2007 cover banks capital market exposure. Such exposures include both their direct exposures and indirect exposures. RBI, limits on Banks' Exposure to Capital Markets comprises statutory limit on shareholding in companies as defined in the Banking Regulation Act, 1949. This is an aggregate holding limit for each company. While granting any advance against shares, underwriting any issue of shares, or acquiring any shares on investment account or even in lieu of debt of any company, these statutory provisions should be strictly observed. It also included the regulatory limit on the aggregate exposure of a bank to the capital markets in all forms (both fund based and non-fund based). There are also caps on the bank's direct investment in shares, convertible bonds / debentures, units of equity-oriented mutual funds and all exposures to Venture Capital Funds (VCFs) [both registered and unregistered]. This paper looks at banks' exposure to sensitive sectors and its impact on formation of NPA and thus its importance in management of portfolio of advances.

III. Research Gap, Objectives and Methodology

It appears that there is evidence of study of formation of asset bubbles etc across the world however, the impact of exposure to sensitive sectors on NPA is not quite well researched. Therefore this gap has been identified and is explored here.

Research Objectives :
The following objectives have been outlined.
1. To estimate impact of exposure to sensitive sectors on NPA formation in Indian banks.
2. To stipulate of a regression model for the above.

Research Questions
1. What proportion of sensitive sector exposure may be related to incremental NPA?
2. Whether these proportions can be predicted at the portfolio level ?
3. Whether there is any difference for groups within PSU and PrSB?
4. Whether there is any difference in the findings over time ?

The underlying model for this study is broadly summarized in **Fig 1**.
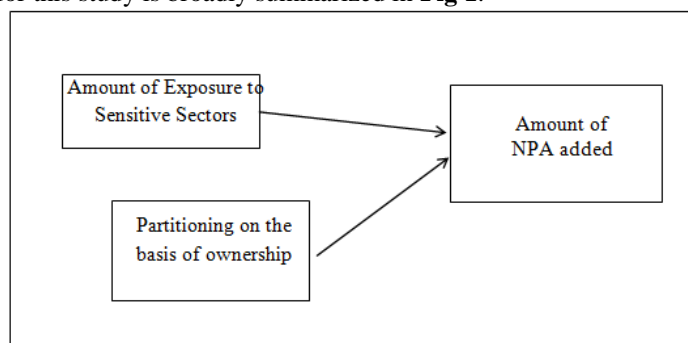
Figure 1 : Schematic Model for Sensitive Sector Analysis

Different banks have different foci for dealing with creation of their loan book and NPA management, all of them within the boundaries specified by RBI however, information pertaining to most of these are not extensively available in the public domain. In this context, an attempt has been made to explore the relationship if any between exposure to sensitive sector and NPA formation in PSU and PrSB on the basis of publicly available information. Ideally, banks should base credit decisions on probability of returns, given the different types of information received from prospective borrowers, however, it is difficult to obtain such probability distributions.

Research Methodology

Scale / Sample – encompassing all players in the Indian banking industry belonging to both PSU and PrSB, as per RBI Profile of Banks – 2013 i.e. 26 PSU banks and 20 PrSB for in-depth analysis of this phenomenon.

Data Period – The study covers data from 2002 – 2016 for this analysis. Research is based on secondary data in the public domain.

Data Analysis – use of ordinary least squares regression data analysis has been conducted for estimating the relationship.

Data Sources – Bank specific Data has been obtained from Reserve Bank of India website, Capitaline Database, AceEquity database, Bank Annual Reports.

Choice of the variables and data structure :

Amount of exposure to sensitive sector by banks, Amount of gross NPA and amount of gross NPA added during the year.

The following broad structure of the data was considered:

No. of entities (26 PSU + 20 PrSB) = 46
No. of years   = 15
Total No of rows of data   = 46x15 = 690.

However certain banks have not been able to disclose their information / or their balance sheets are not available, further, one bank commenced operations only in 2005 (loss of 3 data points) and one bank was merged with another as on March 31, 2015 (loss of 2 data points) and there were few instances of missing information. Variables used : exposure to sensitive sectors and GNPA added during the year in addition to a few categorical variables used to classify the groups / segments / time period. **Fig 2** shows total bank exposure in Sensitive Sectors as a % of total advances. It can be seen that total sensitive sector exposure had an overall range from about 2-3% upto 2004 to 20% in 2008 and about 18% currently, hence they can be considered significant.
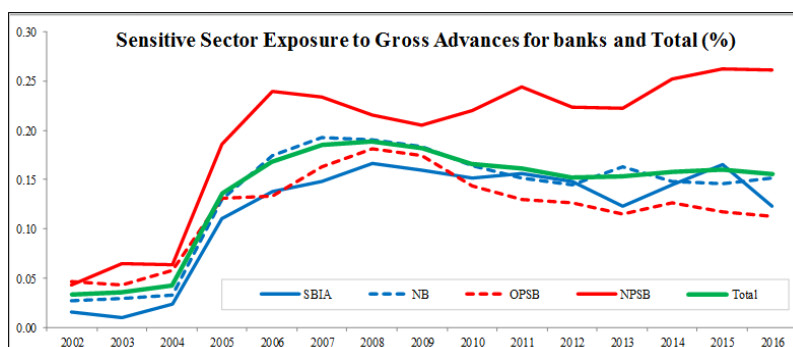
Figure 2 : Total Sensitive Sector to Total Advances
Source: Empirical data used for the analysis.

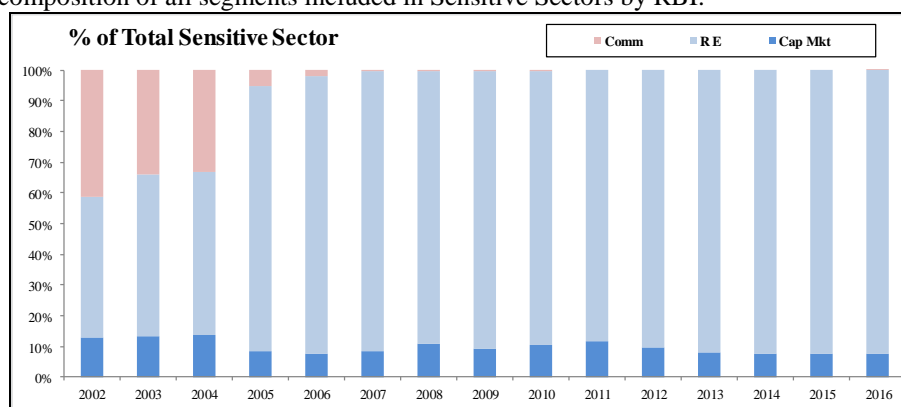**Fig 3** shows composition of all segments included in Sensitive Sectors by RBI.

Figure 3 : Break up of Sensitive Sector Components
Source: *Empirical data used for the analysis.*

It can be seen that Real Estate constitutes the largest segment of the sensitive sectors. Using the entire database, correlation of incremental NPA and total sensitive sector exposure of banks (670 observations) was could to be 0.7468, indicating strong correlation. Our analysis presents a strong case for a detailed study by lenders into the causes of NPA formation and to manage their exposures to sensitive sectors better with a view to minimising NPA formation. In this context, the proposed analysis has practical value for application by regulators and lenders for management of their lending business.

Formulation of the Problem

The following formulation is proposed.

GNPA added = f(Sensitive Sector exposure)   ….(4.1.1)

For statistical clarity, the equation can be restated as:

GNPA added = a1 + b1 * SS + error term   ….(4.1.2)

Where, a1 is constant term in the regression equation, and b1 is the coefficient of the equation. For the sake of this analysis, the constant term has been dropped. Such a formulation helps measure relationship between exposure to sensitive sector and GNPA added. Another way to interpret the coefficient could be – the coefficient represents how much of the current sensitive sector exposure is likely to contribute to NPA formation. This is potential area for banks to examine the situation and apply how to manage NPA. As formulated above, the mathematical technique rests on two key variables – GNPA added and sensitive sector exposure as at the end of the year. As stated earlier, ordinary regression technique was deployed to estimate the parameter. Unit of measurement of Indian Currency is Rs Crore, where, 1 Crore = 10 Million. A snapshot of the data, comprising available rows of data for Allahabad Bank, HDFC Bank and State Bank of India is at **Table 1**.

Table 1 : Snapshot of Underlying data

Bank	Bkode	Year	Sector	GROUP	CRISIS	SENSEX	GNPAa	TOTSENSEC
ALLAHABAD BANK	7	2016	PSU	NB	POST	0	12925	16531
ALLAHABAD BANK	7	2015	PSU	NB	POST	0	5021	15084
ALLAHABAD BANK	7	2014	PSU	NB	POST	0	6021	14215
ALLAHABAD BANK	7	2013	PSU	NB	POST	0	5892	15007
ALLAHABAD BANK	7	2012	PSU	NB	POST	0	2232	12539
HDFC BANK	42	2016	PRIVATE	NPSB	POST	1	5713	76805
HDFC BANK	42	2015	PRIVATE	NPSB	POST	1	4790	56546
HDFC BANK	42	2014	PRIVATE	NPSB	POST	1	4622	45993
HDFC BANK	42	2013	PRIVATE	NPSB	POST	1	3138	3763
HDFC BANK	42	2012	PRIVATE	NPSB	POST	1	1575	32328
HDFC BANK	42	2011	PRIVATE	NPSB	POST	1	1451	36298
HDFC BANK	42	2010	PRIVATE	NPSB	POST	1	2611	30979
HDFC BANK	42	2009	PRIVATE	NPSB	POST	1	3413	22794
HDFC BANK	42	2008	PRIVATE	NPSB	PRE	1	1203	14641
HDFC BANK	42	2007	PRIVATE	NPSB	PRE	1	779	8885
STATE BANK OF INDIA	1	2016	PSU	SBIA	POST	1	64198	279525
STATE BANK OF INDIA	1	2015	PSU	SBIA	POST	1	29435	236977
STATE BANK OF INDIA	1	2014	PSU	SBIA	POST	1	41217	199196
STATE BANK OF INDIA	1	2013	PSU	SBIA	POST	1	31993	180796
STATE BANK OF INDIA	1	2012	PSU	SBIA	POST	1	24712	148239
STATE BANK OF INDIA	1	2011	PSU	SBIA	POST	1	18146	144959
STATE BANK OF INDIA	1	2010	PSU	SBIA	POST	1	11843	95020
STATE BANK OF INDIA	1	2009	PSU	SBIA	POST	1	11140	71079

Source: *Empirical data used for the analysis, collected as raw data from sources described earlier.*

Description of variables and descriptive statistics :

Sensitive Sector Advances: Total advances extended to the Sensitive Sectors reported by banks in their annual reports as at the end of each year. These are reported in Rs crore for each year. Underlying data corresponding to this variable is presented in **Table 2** for all banks classified separately into SBIA, NB, OPSB and NPSB.

Table 2 : Bank Type Total Exposure to Sensitive Sectors (Rs Crore)

	SBIA	NB	PSU	OPSB	NPSB	Private	All Tot
2002	968	10049	11017	2048	1751	3799	14816
2003	875	12218	13093	4076	1748	5824	18917
2004	1622	16131	17753	5650	2471	8122	25875
2005	25902	70111	96013	49048	8934	57982	153995
2006	47313	122035	169348	74361	11074	85434	254783
2007	61711	174358	236070	111260	15956	127216	363286
2008	88858	220230	309088	128402	20481	148883	457971
2009	99055	270055	369110	135006	23753	158759	527869
2010	125312	296272	421584	146045	24943	170988	592572
2011	180286	340470	520757	199922	27609	227531	748287
2012	188966	367931	556896	210651	42190	252841	809737
2013	214497	408621	623118	215850	41916	257766	880884
2014	249494	489381	738875	305451	49944	355395	1094269
2015	298112	527903	826015	374393	51251	425644	1251658
2016	314374	568134	882508	452251	58352	510603	1393111
CAGR	0.47	0.29	0.42	0.33	0.51	0.37	0.38

Source: Empirical data used for the analysis, collected as raw data

Total sensitive sector exposure of all banks grew from Rs 14,816 crore in 2002 to Rs 13,93,111 crore at a CAGR of 38% of which, NPSB grew at the highest rate of 51% followed by SBIA which grew by a CAGR of about 47% then by OPSB which grew at about 37% and NB which grew at the slowest rate of 29% during the period under review though its amount was the highest. It can be seen from **Table 2** that NB had by far the biggest share in the sensitive sector exposures of all banks which is due to their large number and scale of operations. Descriptive statistics of Total Sensitive Sector exposure of all banks is presented in **Table 3**.

**Table 3 :** Descriptive Statistics of Sensitive Sector Exposure of all **banks**

	Min	Max	Average	St Dev	Times*
SBIA	875	3,14,374	1,26,490	1,08,334	5.0
NB	10,049	5,68,134	2,59,593	1,90,547	10.2
PSU	11,017	8,82,508	3,86,083	2,98,149	
OPSB	1,748	58,352	25,492	19,185	1.0
NPSB	2,048	4,52,251	1,60,961	1,35,414	6.3
PRIVATE	3,799	5,10,603	1,86,452	1,54,095	
Total	14,816	13,93,111	5,72,535	4,50,462	

Source : Computed from empirical data used for the analysis

* : Times * indicates how many times average of a particular bank group measured against average of OPSB

It can be seen from **Table 3** that average NB sensitive sector advances were about 10 times the OPSB advances, while SBIA was about 5 times and NPSB was 6 times.

Gross NPA added : Total amount of loans which were classified as fresh GNPA as at the end of the year of reporting. Total GNPA added for all banks is at **Figure 4**.
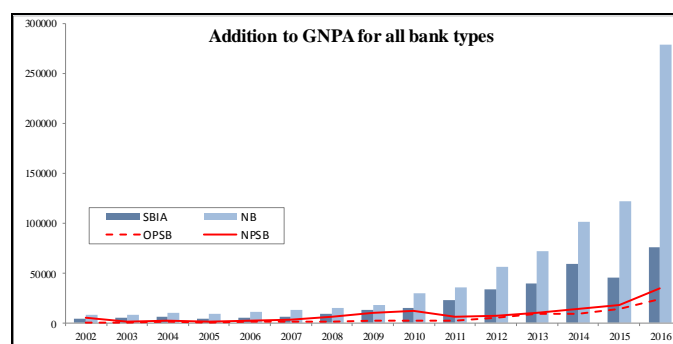
Figure 4 Addition to GNPA for all bank types
Source: Empirical data used for the analysis.

Table 4 shows GNPA added for all banks.

<p style="text-align:center">Table 4: GNPA Added for all banks (Rs crore)</p>

	SBIA	**NB**	**PSU**	**OPSB**	**NPSB**	**Private**	**All Tot**
2002	4707	7987	12694	875	5539	6413	19108
2003	5168	8556	13724	844	1605	2449	16173
2004	6253	9772	16025	910	2280	3189	19214
2005	4777	9259	14036	859	1819	2678	16714
2006	4938	10884	15821	955	1919	2874	18696
2007	6001	13350	19351	1249	3663	4912	24264
2008	9165	14617	23782	1182	5796	6978	30761
2009	12793	18459	31252	2018	10644	12662	43914
2010	14715	29702	44417	2642	11983	14625	59042
2011	22712	35515	58227	2397	6273	8670	66897
2012	34122	56462	90584	4945	7126	12071	102655
2013	39720	72100	111820	9102	10059	19161	130981
2014	59256	101013	160269	8889	13755	22644	182913
2015	45251	121849	167100	14006	17814	31821	198920
2016	75728	278246	353974	23915	34619	58534	412508
CAGR	0.219	0.289	0.268	0.267	0.140	0.171	0.245

<p style="text-align:center">Source: Empirical data used for the analysis.</p>

Total GNPA added of all banks grew from Rs 19,108 crore in 2002 to Rs 4,12,508 crore in 2016 at a CAGR of 24.5% of which, NB grew at the highest rate of 29% followed by SBIA which grew by a CAGR of about 22% then by OPSB which grew at about 27% and NPSB which grew at the slowest rate of 14% during the period under review.

Table 5 contains descriptive statistics of GNPA added of all types of banks.

<p style="text-align:center">Table 5 : Descriptive Statistics of GNPA added for all banks (Rs crore)</p>

	Count	**Min**	**Max**	**Average**	**StDev**	**Times ***
SBIA	90	4,707	75,728	23,020	22,737	4.6
NB	300	7,987	2,78,246	52,518	72,110	10.5
PSU	**390**	**12,694**	**3,53,974**	**75,538**	**93,487**	
OPSB	163	844	23,915	4,986	6,575	1.0
NPSB	102	1,605	34,619	8,993	8,588	1.8
PRIVATE	**265**	**2,449**	**58,534**	**13,979**	**14,948**	
Total	**655**	**16,173**	**4,12,508**	**89,517**	**1,08,144**	

<p style="text-align:center">Source: Computed from empirical data used for the analysis</p>

* : Times * indicates how many times average of a particular bank group measured against average of OPSB

It can be seen from the above that SBIA and NB had a very large share of GNPA added over the period of observation compared to OPSB and NPSB. Average SBIA GNPA added was about 4.6 times that of OPSB and average NB GNPA added was 10.5 times that of OPSB while the average NPSB GNPA added was 1.8 times the average OPSB GNPA.

Figure 5 shows GNPA added and Total Sensitive Sector Exposure (Rs crore) for both NB and SBIA, both pre and post crisis.
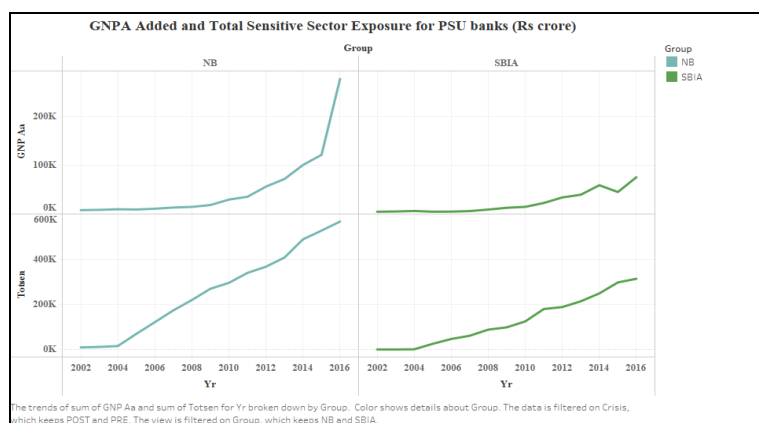
<p style="text-align:center">Figure 5 NPA added and Sensitive Sector Exposure of PSU banks (Rs crore) PRE & POST CRISIS
Source: Empirical data used for the analysis. Graphical analysis using Tableau 10.1</p>

It can be seen that NB had a steep exposure to sensitive sectors and also a very high increase in NPA added particularly, after the global financial crisis. **Figure 6** shows GNPA added and Total Sensitive Sector Exposure (Rs crore) for both OPSB and NPSB for both pre and post crisis.
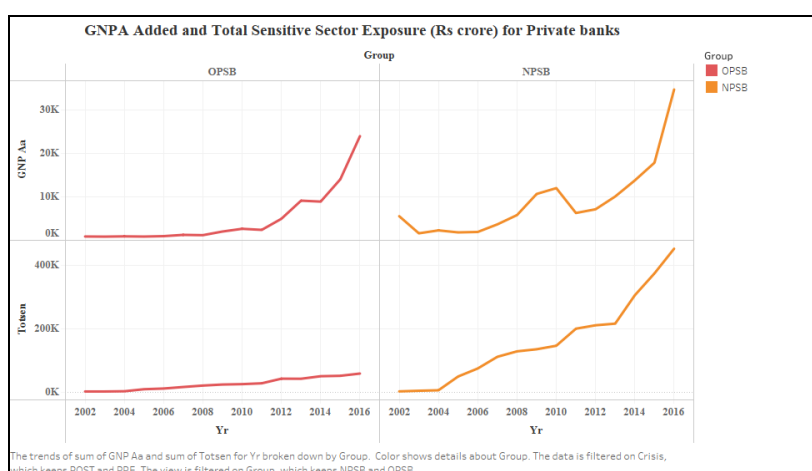
Figure 6 : NPA added and Sensitive Sector Exposure of Private banks (Rs crore) PRE & POST CRISIS
Source: Empirical data used for the analysis. Graphical analysis using Tableau 10.1

It can be seen that while OPSB maintained a modest exposure to sensitive sectors post crisis, in recent years, its NPA added has grown at a high rate. In case of NPSB, both the exposure and the NPA added has grown quite steeply particularly in recent years.

IV. Data analysis and findings

Data Analysis

For the analysis of the data, a base case was first obtained, and subsequently, data was analysed by partitioning it based on ownership (PSU / PRIVATE), groups within each ownership (SBIA, NB, OPSB and NPSB) and time wise distribution viz pre and post financial crisis. As a further analysis, data was analysed for banks which are included in BSE Sensex and those not included in the BSE Sensex. Thus a total of 11 models / variants were obtained from the data. Summary of results / findings are presented in **Table 6** and **Table 7**, for all 46 banks, for pooled and partitioned data.

Table 6 : Summary of Results: All Years Data (670 rows)

GNPAa	POOLED	By Ownership		By Bank Group Type			
		PSU	**PRIVATE**	**SBIA**	**NB**	**OPSB**	**NPSB**
No. >>	**670**	**390**	**280**	**90**	**300**	**178**	**102**
R2	0.6171	0.7620	0.5691	0.9306	0.6165	0.5194	0.7666
Lower	0.1115	0.1623	0.0396	0.1390	0.1818	0.1224	0.0366
Sen Sec	**0.1431**	**0.1930**	**0.0538**	**0.1778**	**0.2328**	**0.2806**	**0.0512**
Upper	0.1747	0.2237	0.0680	0.2166	0.2837	0.4387	0.0659
p>|t|	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Empirical data used for the analysis.

Table 7 : Additional Results of Regression Analysis

GNPAa	POOLED	By Time, wrt Crisis		By Sensex	
		PRE	**POST**	**Sensex**	**Non S**
No. >>	**670**	**312**	**358**	**60**	**610**
R2	0.6171	0.4090	0.6340	0.7333	0.6059
Lower	0.1115	0.0356	0.1157	0.0804	0.1811
SEN SEC	**0.1431**	**0.0605**	**0.1484**	**0.1227**	**0.2285**
Upper	0.1747	0.0854	0.1812	0.1650	0.2757
p>|t|	0.000	0.000	0.000	0.000	0.000

(p-values of the coefficients are also indicated, with insignificant values (>0.05) appearing in bold font, corresponding lower and upper limits of the estimated coefficients have been omitted)
Source: Presented from the analysis outputs

V. Discussion of Results

All India Banks Pooled data: Sensitive Sector Advances had significant coefficient having a value of 0.1431 and 95% CI span of 0.1115and 0.1747. The model fit appears acceptable at R2 of 0.6171.

Ownership effect:

PSU Banks: Sensitive Sector Advances had significant coefficient having a value of 0.1930 with 95% CI span of 0.1623 and 0.2237. The model fit appears acceptable at R2 of 0.7620.

Private Banks: Sensitive Sector Advances had significant coefficient having a value of 0.0538 and 95% CI span of 0.0396 and 0.0680. The model fit appears acceptable at R2 of 0.5691.

It may be seen that on an average, in case of PSU banks, Sensitive Sector exposure has a higher potential impact on GNPA added during the year. The coefficient for PSU Banks is about 4 times that for Private Sector Banks.

Group classification:

SBIA: In case of SBIA, Sensitive Sector Advances had significant coefficient having a value of 0.1778 and 95% CI span of 0.1390 and 0.2166. The model fit appears acceptable at R2 of 0.9306.

NB: In case of NB, Sensitive Sector Advances had significant coefficient having a value of 0.2328 and 95% CI span of 0.1818 and 0.2837. The model fit appears acceptable at R2 of 0.6165.

OPSB: In case of OPSB, Sensitive Sector Advances had significant coefficient having a value of 0.2806 and 95% CI span of 0.1224 and 0.4387. The model fit appears acceptable at R2 of 0.5194.

NPSB: In case of NPSB, Sensitive Sector Advances had significant coefficient having a value of 0.0512 and 95% CI span of 0.0366 and 0.0659. The model fit appears acceptable at R2 of 0.7666.

Except for NPSB, all other bank groups have a high coefficient for Sensitive Sector Advances to NPA added during the year. This perhaps points to selection problem in all bank types, compared to Private banks.

Time variation:

Pre Crisis: In case of Pre Crisis, Sensitive Sector Advances had significant coefficient having a value of 0.0605 and 95% CI span of 0.0356 and 0.0854. The model fit appears acceptable at R2 of 0.4090.

Post Crisis: In case of Post Crisis, Sensitive Sector Advances had significant coefficient having a value of 0.1484 and 95% CI span of 0.1157 and 0.1812. The model fit appears acceptable at R2 of 0.6340.

It may be seen that post crisis, the coefficient has more than doubled, indicating perhaps that the sensitive sector asset markets are having a bigger role in NPA formation and care needs to be exercised by all banks to remain within the monitoring domain of RBI.

Inclusion in Sensex:

Sensex: In case of Sensex banks, Sensitive Sector advances had significant coefficient having a value of 0.1227 and 95% CI span of 0.0804 and 0.1650. The model fit appears acceptable at R2 of 0. 7333.

Not in Sensex: In case of such banks, Sensitive Sector advances had significant coefficient having a value of 0.2285 and 95% CI span of 0.1811 and 0.2757. The model fit appears acceptable at R2 of 0. 6059.

Banks which are included in Sensex had a smaller coefficient than for banks which are not included in the sensex. Perhaps this indicates that being in Sensex leads to a higher scrutiny and such banks may be more careful in their exposure to sensitive sector advances.

Overall

The estimated coefficient of Sensitive Sector Advances on GNPA added has an overall range of 0.0512 to 0.2806 which is disturbing as it indicates that anything between 5-28% of sensitive sector advances could have an impact on NPA additions of the bank at any year end. This range is wide and could send incorrect signals to the market. This may point towards need for careful monitoring of exposure to sensitive sectors which may lead to substantial improvements in the health of banks.

VI. Conclusions

- Sensitive sectors have an impact of gross NPA added. There are various irregularities in the sensitive sector markets, as reported in the press from time to time and hence there is greater need of caution in the banks while taking up exposure in sensitive sectors. Further, there could be more research in the sensitive sector practices in order to make things better for banks.
- The range of coefficient computed above is wide for different bank groups / models.
- There is need for bank managements and regulators to press for reduction in the coefficient in order to ensure financial health of the banks.
- There is a case for further research by incorporating more variables and conducting more analysis.
- The study is presented subject to the following limitations of the study and the data.
- The study is based on secondary data.
- There could be other factors which could impact the coefficients, including societal and temporal factors.
- Due to the presence of very large banks like State Bank of India, Bank of India, Punjab National Bank,

Bank of Baroda, ICICI Bank, HDFC Bank etc, the data is somewhat skewed. Most other players had a much smaller share of the market. Dropping such large banks for sake of obtaining better distribution of the data would have vitiated the entire exercise. Hence they have been retained in the analysis and robust analysis has been conducted.

VII.   Implications And Policy Recommendations

Following action points for bank managements appear to be originating from the above findings.

- Regulator / bank managements may study the findings, research further with live data and arrive at suitable metrics with a view to monitoring impact of sensitive sector advances on NPA added in a year in order to minimize incidence of fresh NPA.
- Separate indices may be generated for different industries and / or other segmentation as each loan product / segmentation. This may be used as sub-limits for exposure, in case it is desired. This may be a good first step to address sector specific or loan type specific attention by bank managements.
- Banks may do a detailed research with live data on the reasons of addition to NPAs and gradually focus on internal and external reasons and take steps to ensure information asymmetry issues are addressed at the time of sanction to minimize occurrence of NPA.
- Annual Credit Policy documents of banks / agreement with Ministry of Finance may be revised / focused to include and improve this metric, possibly with industry wise / sector wise loans and incidence of NPAs, and toning up credit and monitoring system.
- Regulators may encourage banks to take steps to achieve a desired (bank-declared) value considering their specific circumstances, as part of risk management.
- It would be imperative for banks to be extremely cautious and exercise diligence in sanctioning all loans so as to achieve minimal value for the above coefficients for all cases.

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