Determinants of Non-Performing Loans in India: A System GMM Panel Approach

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The objective of the resent study is to investigate the determinants of Non-Performing Loans (NPLs) of the Indian banking system for the period 2000-01 to 2015-16. This study utilized the system-GMM panel estimation method. This method reduces finite sample bias and any other imprecision by regressing levels and changes in NPLs of its lags and other explanatory variables using lagged levels as instruments. The major findings of the study are as follows; (a) among macroeconomic variables; economic growth, stock market index and market capitalization ratio have negative impact on the Gross NPLs ratio, whereas, expansionary fiscal policy escalates the Gross NPL ratio. (b) Corporate specific variables; net sales growth (SLGC) and net profit margin (NPMC) have statistically negative impact on the Gross NPL ratio. (c.) Bank specific variables; higher credit deposit ratio, growth in bank branches, higher return on equity and higher CRAR will lower Gross NPL ratio. Higher operating expense ratio has significant positive impact on the NPLs, which is indicative of inefficiency of the banks. By examining the impact of corporate specific variables (e.g., SLGC and NPMC) on NPLs in India, the study has established a link between the balance sheet of banks and corporate sectors for the first time. It is established that strengthening the balance sheet of private corporate sectors will strengthen the balance sheet of banks by lowering the NPLs. Therefore, it resolves the twin balance sheet problem in India.

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Section I
Introduction

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Financial stability is one of the key fundamentals which endorses rapid and sustained economic development. Besides ensuring the most productive allocation of investible funds in the economy, it is also thwarts any external threats that an economy may face any time (Dutta *et.al.* 2013). The global economic recession in 2008-09 was one of such threats that worsened the financial stability across the world. Among the various financial stability indicators, non-performing loans (NPLs) is considered as most critical indicator, because it is closely linked with problems pertaining to the financial system. In this context, Us (2017) found a strong correlation between the higher level of NPLs and banking crises. NPLs not only adversely affects the asset quality of the banks but also the efficiency in resource allocation and the credit risk management which further depreciate their profitability, liquidity of banks, and creditworthiness of the borrowers (Michael, *et al,* 2006; Ghosh, 2015; Us, 2017).

NPLs may increase deposit liabilities of the banks and reduce the availability of bank credit for the private sector, and thereby, hampering the private investment, Fofack (2005). According to Global Financial Stability Report (April, 2017)[1], increasing non-performing loans are reflecting various economic challenges, for instance, economic weakness (specifically, in Russia and Brazil), sector-specific slumps in India and corporate leverage growth in China. In response, banks have also raised provisioning level, but that was not enough to keep pace with the increasing of bad loans.

In India, the concept of NPL emerged as one of the prime issue after the recommendation of the Narasimham Committee Report (1991)[2] because the committee was highlighted its influences on the financial health of the banks. The committee reported that the high level of NPL has been the proximate cause of the low profitability levels of the banks. According to the report, the major causes of high level NPL are poor credit decisions in the banks' management, inconsistency in the recovery management of the banks, and cyclical and structural changes in the economic environment.

In 1996-97, the gross NPLs of all scheduled commercial banks was Rs. 473 billion (i.e., 15.7 per cent of their gross advances) in which the contribution of public sector banks was Rs. 435.77 billion (i.e., 92 per cent of total gross NPL of all scheduled commercial banks). However, due to implementation of the recommendations of the Narsimham committee and other corrective measures

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1. International Monetary Fund, (2017), Global Financial Stability Report: Getting the Policy Mix Right, Washington, DC, April.

2. Government of India, Narasimhan Committee Submits its report to FM, retrieved from http://pib.nic.in/focus/fomore/narsim.html.

taken by RBI, the gross NPL declined to its lowest level at 2.26 per cent (i.e., Rs. 566.06 billion) of gross advances in 2007-08. After the global economic crisis, all bank-groups witnessed a sharp increase in their gross NPL ratio. In the year 2016, the gross NPL ratio was 6.4 per cent for SBI and its associates; 10.7 per cent for Nationalised banks; 2.8 per cent for private sector banks; and 4.2 per cent for foreign banks. According to RBI's Financial Stability Report (June, 2017), deterioration of asset quality and profitability of banks has worsened the banking stability indicator between September 2016 to March 2017. The worsening financial health of banks may because of minimum capital requirement as stipulated in Basel norms. In addition, it indicates that NPLs of all scheduled commercial banks may surge to 10.2 per cent (this may rise to 11.2 per cent in severe stress scenario) by March 2018 from its corresponding value of 9.6 per cent in March 2017.

The Economic Survey of India (2016-17) has attributed "Twin Balance Sheet (TBS) Problem" for the worsening of asset quality of Banks. 'TBS' is a situation where both the banking and corporate sectors are under stress. Over leveraged corporates are unable to service their debts and invest more. Because of the huge bad loans in the balance sheet, banks are unwilling to lend more and struggle to keep up their business. TBS problem, essentially, is due to the weak balance sheet of both banks and private corporate sectors that has led subdued supply and demand for loans. As a result, the economy has further slowed down.

Under this backdrop, an attempt has been made to reinvestigate the key determinants of NPLs in the Indian banking system for the period 2000-01 to 2015-16. The Asian financial crisis in 1997 and nuclear blasts in 1998 have brought structural changes in the Indian economy (Sengupta and Vardhan, 2017). In the 2000s, the banking sector also witnessed structural changes. During 2003-07, the bank credit has grown at a staggering rate of 25 per cent along with the higher volume of NPLs, which posed alarming concern for the banking sector in India. According to Us (2017), the global financial crisis also played a role of the catalyst for enhancement of the NPLs in the banking system. Aforementioned circumstances have motivated us to take-up the study period 2000-01 to 2015-16. Apart from macroeconomic and bank specific variables, corporate specific variables are also introduced in the study, namely, net sales growth (SLGC) and net profit margin (NPMC). This is because higher SLGC and NPMC generates more cash flows for the private corporate sectors and thereby, increases loan repayment capacity during the scheduled time. Therefore, SLGC and NPMC as major corporate specific variables may have significant impact on NPLs.

The system-GMM estimation developed by Arellano and Bover (1995), Blundell and Bond (1998) is used in the present study, because the study constitutes of micro panel data. The system-GMM estimator has the superiority over other estimators when the number of individuals are small and largely unknown (Soto, 2009).

Rest of the paper is divided in to four sections. While Section II deals with the literature review, data and methodology used in the study is described in the Section III. Section IV explains the empirical results, whereas Section V concludes the finding of the study along with policy implication.

Section II
Literature Review

The existing economic literature on NPL suggests that the determinants of NPL may be categorised in two groups, *viz.*, macroeconomic and bank specific determinants (Louzis *et al.*, 2012; Klein, 2013; Makri *et al.* 2014; Ekanayake and Azeez, 2015; Ghosh, 2015; Dimitrios *et al.*, 2016; Patra and Padhi, 2016; Rajha, 2016; Amuakwa-Mensah *et al.*, 2017; Kjosevshi and Petkovski, 2017). Under the macroeconomic variables, economic growth (GDP), interest rate, fiscal deficit ratio, stock market index, market capitalization ratio and other various macroeconomic factors (e.g., inflation, exchange rate, unemployment rate and public debt, etc.) are vital determinants of NPL. In addition, under the bank specific variables, credit deposit ratio, capital adequacy ratio, operating expenses ratio, returns on equity, ratio of priority sector advances to total advances, growth in bank branches and various other bank specific indicators (e.g., net interest margin, bank size and returns on assets, etc.) are important determinants of NPL.

Higher GDP growth usually deciphers more income, which will boost debt servicing ability of borrowers, and thereby, contributes to the reduction of NPLs and *vice versa* (Nkusu, 2011; Khemraj and Pasha, 2009). There are substantial amount of empirical findings that approved the inverse relationship between economic growth and NPLs (Castro, 2013; Bofondi and Ropele, 2011; Tanaskovi? and Jandri?, 2015; Abid *et al.*, 2014; Louzis *et al.*, 2012; Ghosh, 2015; Makri *et al.*, 2014; Bhattarai, 2014; Haniifah, 2015; Ekanayake and Azeez, 2015; Das and Ghosh, 2007; Reddy, 2015; Nkusu, 2011; Messai and Jouini, 2013; Tucker, 2013; Rajha, 2016; Kjosevski and Petkovski, 2017; Prasanna *et al.*, 2014; Roy, 2014).

The lending rate can be used as a proxy for interest rates charged against loans and advances (Rajha, 2016). Higher interest rate weakens repayment ability of borrowers and escalates their debt burden further. Therefore, lending rate and NPLs may have a positive association. There are numerous empirical evidences that suggest a positive relation between lending rate and NPLs (Khemraj and Pasha, 2009; Adebola *et al.*, 2011; Farhan *et al.* 2012; Abid *et al.*, 2014; Ekanayake and Azeez, 2015; Ghosh, 2015; Patra and Padhi, 2016).

It is expected that higher gross fiscal deficit adds to the existing borrowings resulting into accumulation of debt and rise in outstanding debt of the government. According to Dimitrios *et al.* (2016) expansionary fiscal policy

may alleviate or worsen the NPLs problem of the economy. Patra and Padhi (2016) found a positive correlation between fiscal deficit and NPL. An analysis of the euro-area banking system has suggested that output gap and personal income tax are key drivers of NPLs (Dimitrios *et al.*, 2016).

Apart from the above findings, Nkusu (2011) scrutinized the nexus between NPLs and macroeconomic variables of 26 advanced economies over the period 1998 to 2009. In his panel analysis, he found that unemployment rate and policy rate have positive impact on NPLs, whereas house prices and equity prices have negative impact on the same. Bofondi and Ropele, (2011) also concluded that house prices and NPLs of the Italian banking system are inversely related and unemployment rate is positively related to NPLs for the period 1990:Q1 to 2010:Q2. Louzis *et al.* (2012) have found that NPLs in the Greek banking sector to be majorly determined by GDP, interest rate, unemployment rate, public debt, and management quality. Castro (2013) found that housing price and share price indices are inversely related to the banking credit risk, whereas, real exchange rate, unemployment rate and credit growth are positively related for the Sub-Saharan African countries. Makri *et al.* (2014) used difference GMM approaches and found that return on equity and bank capital ratio have negative impact on NPLs, while lag of NPL ratio, public debt ratio and unemployment have positive impact in Eurozone's banking system.

In the Tunisian banking system, the key determinant of the NPLs are GDP, inflation, interest rate and bad management (Abid *et al.*, 2014). An empirical analysis observed that the foreign currency loan ratio and exchange rate have positive impact on NPLs for Central and Eastern and South-Eastern Europe (CESEE) economies (Tanaskovi? and Jandri? 2015). In his analysis on the banking system of 50 US states and the District of Columbia, Ghosh (2015) concluded that among bank specific variables; liquidity risks, higher capitalization, poor credit quality, banking industry size, and greater cost inefficiency have positive influence on NPLs, whereas higher bank profitability has negative impact. Under macroeconomic specific variables; real personal income growth and state housing price index are negatively related to NPLs, while inflation, US public debt, and state unemployment rates are positively related to NPLs.

Rajha (2016) found that inflation has negative impact on NPLs, whereas global financial crisis has positive impact on NPLs in Jordanian Banks over the period 2007 to 2012. For the period 2005 to 2014, Kjosevski and Petkovski (2017) analyzed an unbalance panel data of 27 banks of the Baltic States. They found that return on assets and return on equity are negatively related to NPLs, while inflation, unemployment, and gross loan growth are positively related to NPL. Net interest margin and cost-income ratio are vital indicators of bank distress where the higher cost-income ratio indicates a poor quality of management and net interest margin designates profitability (Gerhardt and Vennet, 2017). The findings of Gerhardt and Vennet (2017), implicitly imply that the higher

cost-income ratio and low net interest margin lead to higher NPLs. In the Turkish banking system, ownership of banks is a major determinant of NPLs (Us, 2017). Caporale *et al.* (2017) analyzed a panel data of 400 Italian banks to examine the key determinants of loan-loss provision for the period 2001 to 2015. They used discretionary components (e.g., income smoothing and capital management) and non-discretionary components (which were related to business cycle). They found that non-discretionary components and macroeconomic shocks are the major drivers of loan loss provision in Italian banks.

For the period 1995-96 to 1999-2000, Rajaraman and Vasishtha (2002) found a significant bivariate relationship between the operating efficiency indicators and NPLs of 27 public sector banks of India. Ranjan and Dhal (2003) found that terms of credit has a significant impact on NPLs in Indian banking system by considering the bank size and presence of macroeconomic shocks. Additionally, bank size has negative impact on NPL, if it is measured in terms of assets. However, if it is measured in terms of capital, it has significant positive effect on NPL. Reddy *et al.* (2006) evaluated the nexus of NPL and priority sector lending of public sector banks for the period 1992-2004. By using chi-square technique they found that priority sector lending may not be key determinants of NPL. The finding of Das and Ghosh (2007) show that the key determinant of the loan problems are real loan growth, GDP growth, bank size and operating expenses. An empirical results indicates that priority sector lending is negatively associated with NPLs in Indian banking sector, Vallabh *et al.* (2007). Additionally, capital adequacy ratio is positively related with NPL of public sector banks but it is negatively related with NPL of private sector banks.

For the period 1995 to 2009, Misra and Dhal (2010) analyzed 26 public sector banks of India and observed that share of term loans in total advances, interest rate, share of unsecured loans, and credit-deposit ratio have significant adverse impact on the NPLs in the presence of macroeconomic shocks. In panel analysis, Swamy (2012) found that per capita income, bank credit growth rate, credit-deposit ratio, index of industrial production and lower cost of fund are negatively related with NPLs, however, higher operating expense ratio and low return on assets are positively associated with NPL. Prasanna *et al.* (2014) examined the determinants of the NPLs for 31 Indian banks for the period 2000 to 2012 and concluded their finding that economic growth, stock market index, per capita income growth, foreign exchange reserves, construction expenditure, bank size and performances are inverse relationship with non-performing advances. However, repo interest rate, exchange rate and inefficiency ratio are positively related with non-performing advances in Indian banking system. By utilizing fixed effect model in panel analysis, it is found that economic growth, real effective exchange rate and volatility index are inversely related to NPLs (Roy, 2014).

In the case of India, Dhar and Bakshi (2015) examined the effect of bank specific factors upon NPLs of public sector banks for the period 2001 to 2005. By using panel regression technique, they found that quantum of sensitive sector advances has positive impact on NPL, however, capital adequacy ratio and net interest margin have negative impact. Reddy (2015) suggested that return on assets, capital adequacy ratio, priority sector advances, growth in advances, total assets, growth in GDP, are negatively associated with NPL while operating cost ratio is positively related.

In the view of the above literature, GDP growth, average lending rate (as a proxy of interest rate), gross fiscal deficit ratio, market capitalization ratio and stock market index are examined as macroeconomic determinants in the present study; and credit deposit ratio, capital adequacy ratio, operating expenses ratio, returns on equity, priority sector advances ratio, and growth in bank branches are inspected as bank specific determinants in Indian banking system. In addition, net sales growth and net profit margin of private corporate sector are introduced as corporate specific variables in this study.

Section III
Data and Methodology

According to Reserve Bank of India, when an asset (including a leased asset) is unable to generate income to the bank, it is classified as non-performing asset. In addition, when interest and/or installment of principal of a loan or an advance remain overdue for a period of more than 90 days, is called Gross Non-Performing Loan (GNPL).

The objective of the present study to re-investigate the determinants of the NPLs in the Indian banking system for the period 2000-01 to 2015-16. To fulfill the objective, the study have taken into account four bank-groups of all scheduled commercial banks,[4] *viz., (i)* SBI and its associate banks-group, *(ii)* nationalized banks-group, *(iii)* private sector banks-group, *(iv)* foreign banks-group. Hence, total ninety five banks are covered in the study, where, SBI and its associate banks-group includes six banks, nationalized banks-group contains twenty one banks, private sector banks-group involves twenty two banks and foreign banks-group comprises forty six banks. Apart from these four bank-groups, the present study also includes three major categories of variables. The description of these variables are given in Table 1.

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4.   All scheduled commercial banks excluding Regional Rural Banks (RRBs).

Table 1
Description of Variables Included in the Study

Variables	Description
Macroeconomic Specific Variables	
GDP	Annual Growth of Real GDP
FDR	Gross Fiscal Deficit to GDP
MCR	Market Capitalization Ratio (Market Capitalization as a percentage of GDP)
NIFTY	Stock Market Index of National Stock Exchange of India (CNX Nifty)
Bank Specific Variables	
GNPLR	Gross Non-Performing Loans as a percentage of Gross Advances
CDR	Total Credit as a percentage of Total Deposit
LR	Average Lending Rate for the Borrowers
ROE	Return on Equity (Net Profit as a percentage of Total Inside Liability)
PSAR	Priority Sector Advances as a percentage of Net Advances
CRAR	Capital to Risk Weighted Asset Ratio
OPR	Ratio of Operating Expenses to Total Assets
GBO	Growth in Banks Branches
Corporate Specific Variables	
NPMC	Net Profit Margin of Private Corporate Sector (Net Profit as a percentage of Net sales)
SLGC	Net Sales Growth of Private Corporate Sector

The data utilized in this study are sourced from various sources as follow; *(i)* Statistical Tables Relating to Banks in India *(ii)* Handbook of Statistics on Indian Economy *(iii)* RBI Bulletins, all three are published by RBI *(iv)* EPW Research Foundation *(v)* Annual Reports of Securities and Exchange Board of India (SEBI) *(vi)* Historical data of National Stock Exchange of India Ltd.

Econometric Estimation Procedure

To achieve the objective of this study the panel data analysis has been utilized. A time series analysis is carried out when economic agents are homogeneous in nature. However, a cross section analysis provides meaningful insight regarding interlinkages between financial and economic variable by considering heterogeneity of economic agents and their behaviour (Ranjan and Dhal, 2003). Four bank groups i.e., *(i)* SBI and its associate banks-group, *(ii)* nationalized banks-group, *(iii)* private sector banks-group, *(iv)* foreign banks-group, assessed in the study may be considered homogeneous in nature from the institutional perspective, but the functional behaviour (e.g., cost structure, loan portfolio and performance) of each bank across different bank groups

can be heterogeneous in nature (Misra and Dhal, 2010). In this context, a panel analysis would serve the purpose because it incorporates individual characteristics along with regularity/continuity in the cross-section.

Blundell-Bond Linear Dynamic Panel Model

Since the study constitutes of micro panel, the system-GMM estimation approach developed by Arellano and Bover (1995), Blundell and Bond (1998) is considered in this study. According to Blundell and Bond (1998) and Blundell *et al.* (2000) the system GMM estimator has the superiority over other estimators, when the number of individuals are small and largely unknown (Soto, 2009). This method reduces finite sample bias and any other imprecision by regressing levels and changes in NPLs of its lags and other explanatory variables using lagged levels as instruments (Amuakwa-Mensah *et al.*, 2017). Blundell and Bond (1998) assumes no autocorrelation in the idiosyncratic error terms. The initial requirement of this method is that the panel-level effects to be uncorrelated from the first difference of the first observation of the dependent variable[5].

The Blundell-Bond linear dynamic panel model can be defined as:

$$y_{i,t} = \sum_{j=1}^{p} a_j y_{i,t-j} + x_{i,t}\beta_1 + w_{i,t}\beta_2 + v_i + \varepsilon_{i,t}, i = 1,...,N; t = 1,...,T$$

Where, α_j are the p parameters to be estimated, x_{it} are the exogenous variables and β_1 are the coefficient for the exogenous variable, w_{it} are the endogenous variables and β_2 are their coefficients., v_i are the panel level effects and ε_{it} is the identically independently distributed for the whole sample with variance σ^2_ε. There is an assumption that v_i and the ε_{it} are independent for each i and over all t.

Section IV
Empirical Results

This study used Gross NPLs as compared to Net NPLs because it adequately captures the default risk of the borrowers as well as loan default faced by the banks. Net NPLs is Gross NPLs net of provisions, hence, captured the actual loan default in the balance sheet of the banks. Whereas, Gross NPLS reflects absolute value of defaulted loans availed by the borrowers. Therefore, Gross NPLs is a better indicator than Net NPLs for measuring defaulted loans of the banks.

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5. xtdpdsys - Arellano-Bover/Blundell-Bond linear dynamic panel-data estimation, retrieved from https://www.stata.com/manuals13/xtxtdpdsys.pdf.

The growth in real GDP (GDP at factor cost at constant prices) is indicative of rise in income of the economy, hence, reflects the performance of the economy. The rise in income of the economy improves the debt servicing ability of borrowers.

Fiscal Deficit ratio is taken as one of the macroeconomic variables. Through higher fiscal deficit, Government takes away resource available in the market leaving less resources for corporates. As a result, the volume of business of corporates is adversely affected. This in turn, reduces the capacity of the corporates to service the existing loans taken from the banks.

Rise in the growth in real GDP improves the financial performances of private corporate sectors. It induces higher sales growth and net profit margin of the private corporate sectors.

When the economy is growing and the financial performances of the private corporates are improving, then the stock market remains buoyant. For, stock market index, CNX Nifty Index is taken as a proxy.

Market Capitalization at the exchange level shows the size of the corporate sectors listed in that Exchange. Since, National Stock Exchange (NSE) is the biggest stock market in India, we have taken market capitalization from NSE. The market capitalization indicates the value of the listed firms (corporates) and valuation of the firms as perceived by the investors. The market capitalization relative to GDP of India (MCR) is reflective of relative valuation of the listed firms derived from their performances relative to the performance of the economy. When financial performances of the corporate sectors or firms improve, their share price goes up. Besides, the firms mobilize funds by issuing equity instruments. This leads to higher MCR both at firm level and exchange level.

Hence, a high collinearly exists between macroeconomic specific variables (GDP, FDR, MCR, and NIFTY) and corporate specific variables (NPMC and SLGC).

Therefore, to capture the impact of macroeconomic variables, corporate specific variables and bank specific variables on GNPLR separately, we have built seven models using Blundell-Bond Dynamic Panel Estimation. Bank specific variables are same across all seven models. However, in order to avoid collinearity problem, macroeconomic and corporate specific variables are used interchangeably across all seven models (see for details Appendix-I). The detailed estimation is presented in Table 2.

Table 2
Blundell-Bond (1998) System-GMM Estimation

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
$GNPLR_{i,t-1}$	0.25***	0.26**	0.40***	0.20**	0.44***	0.41***	0.30***
	(0.00)	(0.01)	(0.00)	(0.05)	(0.00)	(0.00)	(0.00)
$RGDP_t$	-0.57***						
	(0.00)						
$NPMC_t$		-0.47***					
		(0.00)					
$SLGC_t$			-0.07**				
			(0.01)				
MCR_t				-0.04***			
				(0.00)			
$NIFTY_t$					-0.02***		
					(0.00)		
$GFDR_t$						0.45***	
						(0.00)	
$PSAR_{i,t}$							-0.23***
							(0.00)
$ROE_{i,t}$	-0.25***	-0.21***	-0.17***	-0.26***	-0.24***	-0.23***	-0.25***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$GBO_{i,t}$	-0.16***	-0.15***	-0.13**	-0.12**	-0.14**	-0.18***	-0.16***
	(0.00)	(0.00)	(0.02)	(0.01)	(0.01)	(0.00)	(0.00)
$OPR_{i,t}$	1.06***	0.91**	1.01**	0.86**	1.15**	0.92**	1.30***
	(0.00)	(0.03)	(0.02)	(0.03)	(0.01)	(0.03)	(0.00)
$CDR_{i,t}$	-0.11***	-0.11***	-0.09**	-0.10**	-0.09**	-0.07*	-0.13***
	(0.00)	(0.00)	(0.03)	(0.01)	(0.03)	(0.09)	(0.00)
LR_t	-0.03	0.12	-0.09	-0.05	-0.16	-0.12	-0.08
	(0.76)	(0.33)	(0.44)	(0.68)	(0.17)	(0.28)	(0.43)
$CRAR_{i,t}$	-0.04***	-0.04**	-0.03*	-0.02	-0.03**	-0.03**	-0.01
	(0.00)	(0.02)	(0.07)	(0.16)	(0.03)	(0.02)	(0.34)
Constant	18.36***	16.07***	12.28***	16.83***	12.75***	9.27**	21.65***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)
Wald chi2 test	277.79	214.54	178.09	220.62	180.72	188.26	215.96
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sargan test	58.17	57.69	59.73	57.80	53.26	62.80	62.77
	(0.61)	(0.63)	(0.56)	(0.63)	(0.77)	(0.45)	(0.45)
Number of Instrument	71	71	71	71	71	71	71
Number. of Obs.	60	60	60	60	60	60	60
Number. of Groups	4	4	4	4	4	4	4

Analysis of Macroeconomic Specific Variables

Since, growth in real GDP (RGDP), stock market index (Nifty) and Market Capitalization Ratio (MCR) at exchange level are performance indicators of the economy, they have a negative effect on GNPLR. When the economy performs, the rise in income enables the borrower to repay the loan due to the banks in stipulated time (90 days norms), therefore, recognizing the loan as standard loan (Model 1, Model 4 and Model 5).

However, Gross Fiscal Deficit Ratio (GFDR) as one of the macroeconomic variables has positive effect on GNPLR (Model 6). Expansionary fiscal policy through higher Gross Fiscal Deficit by the Government takes away the available funds in the economy through borrowings. As a result, fewer funds are available for the private corporate sector for their economic activities. This finding is in tune with the study made by Dimitrios *et al*. (2016) and Patra and Padhi (2016). This adversely impacts the business performance of the private borrower; as a result, they are constrained to service their loans during the stipulated time, leading to higher GNPLR. Marki *et al*. (2014) established a significant relationship between higher sovereign borrowings and GNPLR. DaCosta and Foo (2002) examined efforts of China to transform its financial system in order to support its growing economy. Their findings suggest that a financial framework will not be effectual to support an emerging market economy, if financial functions are not distinct from fiscal functions and banks are not independent in terms of deficit financing and policy directives. The findings of this study support this view that an expansionary fiscal policy will induce higher non-performing loans, as a result, the reform measures in banking sector will not be effective.

Analysis Corporate Specific Variables

Better performance of the private corporate sectors is captured by the financial indicators such as higher sales growth and higher net profit margin. Higher Net Sales Growth (SLGC) and Net Profit Margin (NPMC) generates more cash flows for the private corporate sectors. This increases the loan repayment capacity, and repayment due, is paid during the scheduled time. Therefore, rise in SLGC and NPMC as corporate specific variables reduce GNPLR (Model 2 and Model 3).

It is pertinent to note that among macroeconomic and corporate specific variables, RGDP has a significant negative effect on GNPLR, which implies that GNPLR declines with rise in RGDP and vice versa. Therefore, RGDP is a significant determinant of GNPLR. The results of this study supports the findings of Salas and Saurina (2002), Ranjan and Dhal (2003), Dash and Kabra (2010). Likewise, during downturn of the economy, the business performances of the borrowers are adversely affected and borrowers face difficulties in debt servicing due to the banks, resulting into higher NPLs.

Banking Specific Variables

The lagged dependent variable (GNPLR) is indicative of legacy effect of NPLs management. In all our models, the size of the coefficient is less than 0.5 reflecting better NPLs management by Banks (Model 1 to Model 7). Since, the previous year's GNPLR affects the present year GNPLR, a shock to GNPLR would take time to reduce across the banking sector.

Priority Sector includes housing, education, social infrastructure, micro, small and medium enterprises (MSME), agriculture, export credit, renewable energy and others. The Reserve Bank of India data reveals that the contribution to GNPL by the priority sector constitutes 35 per cent, whereas, the share of non-priority sector is 66 per cent[6]. The priority sector lending is socio-economic responsibility of the banks. Therefore, banks serve as instruments of development for the poorer sections of people. In priority sector lending, national government and many sub national governments in India provide interest subvention scheme so as to reduce the interest burden of the borrowers. Sometimes, the government waive off the loan availed by the borrowers during bad crops and repay the debt to the banks on behalf of the borrowers. As a result, higher Priority Sector Advance ratio (PSAR) has negative effect on GNPLR (Model 7, Table 2).

Return on Equity (ROE) indicates financial performance of banks, because it measures the profitability of banks over inside liability (net worth). Profitable banks are not interested in taking exposure on low credit worthy borrowers. If the credit portfolio has more standard loans as compared to toxic loans, then ROE will have negative impact on GNPLR (Godlewski, 2004). In our analysis, ROE has negative impact on GNPLR in all eight models. Additionally, with higher ROE, banks provide loans to borrowers with low creditworthiness, which in turn reduces GNPLR. This suggests that better performing banks manage their net worth more efficiently. Banks with higher profitability may not take low rated borrowers in their loan portfolio. Results of the study supports the findings of Louzis *et al.*, (2012). Besides, Fan and Shaffer (2004) has established a link between high credit risk and low profitability.

Growth in Bank Branches (GBO) facilitate the banks to effectively screening of the loan applications, and the managers get a space to make background verification of the potential use of funds and repaying capacity of the borrowers through proper credit appraisal. GBO, essentially, decentralizes the decision making process of selecting potential borrowers. Hence, in our analysis, rise in GBO has a negative impact on GNPLR across all eight models.

Higher operating expenses (non-interest expenses) relative to total assets (OPR) indicates the inefficiency of banks in managing their Income and Expenditure

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6.   Reserve Bank of India, (2016), Basic Statistical Returns of Scheduled Commercial Banks in India, March.

statement. Higher operating expenses as compared to operating income of the inefficient banks induce more GNPLR (Berger and De Young, 1997). High OPR have fewer resources available to monitor the risk associated with the borrowers during post disbursement period. Banks inefficiency because of high OPR is leads to poor skills in credit management, post disbursement follow-up mechanism, etc. In all eight models of our analysis, OPR not only has positive impact on GNPLR but also the magnitude of coefficient is very high. It supports bad management hypothesis (Gerhardt and Vennet, 2017).

Higher Credit to Deposit ratio (CDR) indicates higher credit expansion by the banks as compared to the deposit mobilization. Higher CDR may lead to stressed loans (Caprio and Klingebiel, 1996). However, more expansion of credit as compared to deposit mobilization may not lead bad loans if it is accompanied by better screening and lending to borrower with low probability of default (low PD). In our analysis, CDR reduces GNPLR in all our eight models. This is attributable to better credit management and post disbursement loan review mechanism adopted by the banks.

Lending rate (LR) is the rate of interest charged to the borrowers for availing loans from banks. It is not the lending rate, but the spread, which is crucial for the banks to generate profit. Spread is the difference between yield on loans and cost of deposits. Along with spread, the higher credit offtake strengthen the financial performance of the banks. The demand for credit is mainly due to macroeconomic factors and the investment opportunities for the private corporate borrowers. As long as the economy is growing and corporate sectors have the opportunity to invest, they will have the repayment capacity irrespective of the level of interest rate. In our empirical analysis, the coefficient of lending rate is statistically insignificant in all eight models. In fact, the Reserve Bank of India uses the policy rate to tackle inflation and to spur GDP growth. The findings of this study contradicts that rise in interest rate worsens the NPL according to the findings of Espinoza and Prasad (2010), and Bofondi and Ropele (2011).

The strength of the bank is repented by Capital (both Tier I and Tier II) to the Risk Weighted Asset Ratio (CRAR). CRAR absorbs unexpected credit loss. The high NPLs level in banks is due to low CRAR (Mukherjee, 2003). High CRAR is also reflective of low leverage of the banks. High CRAR banks may expand the credit base after deciding the risk-return profile of the borrowers. Our empirical results reveal that higher CRAR has negative effect on GNPLR in all eight models, expect the fourth model, where the coefficient is statistically insignificant. The NPL management is taken care of by provisioning, instead of depleting the capital base of the banks. Our result confirms to the studies made by Poghosyan and Cihk, (2011) for the European Union. The banks with low CRAR responds to low credit worthy borrowers, thereby, increasing risks associated with their credit portfolio, which further results into higher GNPLR. Our results support the findings of Berger and DeYoung (1997) that there is inverse relationship

between CRAR and GNPLR, which is based on moral hazard hypothesis. This is because of capitalization in domestic and foreign banks in Oman, Bahrain, Dubai and Abu Dhabi, performance of banks has fared well for the past several years (Islam, 2017).

Section V
Conclusion and Policy Implication

The dynamic panel model approach provides an idea how the macroeconomic specific variables, corporate specific variables and bank specific variables determine GNPL ratio of different types of banks in India during the period beginning in FY 2000-01 and ending in FY 2015-16. In fact, our empirical framework has not been about why the growth of the NPLs happens. Instead, it examines various variables in explaining the deterioration of asset quality and rising NPLs. Among macroeconomic specific variables, the economic growth has greater impact in reducing the Gross NPLs ratio, whereas, expansionary fiscal policy escalates Gross NPLs ratio. Other macroeconomic specific variables such as stock market index and market capitalization ratio of the stock market have statistically significant inverse relationship with Gross NPLs ratio.

Besides, corporate specific variables such as net sales growth and net profit margin have statistically negative impact on Gross NPLs ratio. This implies that higher economic growth, rise in stock market index and better performance in the private corporate sector will scale down Gross NPLs ratio so that banks can supply more credit in order to meet the credit demand in the economy.

Bank specific variables such as higher credit deposit ratio, growth in bank branches, higher return on equity and higher CRAR will lower Gross NPLs ratio. On the contrary, higher operating expense ratio will raise Gross NPLs ratio. Higher operating expense ratio is indicative of inefficiency of the banks. Operating expenses includes expenses on employee wages and administrative expenses. It does not include interest expenses. Hence, higher operating expenses as per cent of total assets is indicative of inefficiency of the banks. However, the impact of lending rate on Gross NPLs ratio is not statistically significant. When both macroeconomic specific variables and corporate specific variables are performing along with other robust bank specific variables as analyzed above, the impact of lending rate is not significant on NPLs. Our findings also belie the fact that priority sector advances generates non-performing loans.

Expecting that Gross NPLs ratio will increase to 10.2 per cent by March 2018, the Government of India is contemplating to infuse Rs.95,000 crore to bolster the capital base of the public sector banks[7]. From our analysis, capital infusion

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7. Ministry of Finance, Government of India (2017).

is one of the factors that impede the problem of NPLs. However, there are other several factor which have been emerged from our study, are to be factored into while addressing deteriorating asset quality of the banks. From policy perspective, investment climate is to be created in order to augment demand for credit so as to have higher capital formation and economic growth. With rise in economic growth, the borrower's performance will also improve in terms sales growth, net profit margin, etc. As a result, the balance sheet of the corporates will be strengthened. Simultaneously, the bank's balance sheet will be strengthened to overcome twin balance sheet problem. Higher efficiency, credit expansion, profitability, expansion of bank branches are the few key parameters that can strengthen the balance sheet of banks. At the same time, to meet the socio-economic objectives, bank can provide adequate credit to priority sector.

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Appendix 1

Econometric Model used in the study:

Model 1:

$$GNPAR_{i,t} = \alpha_1 + \beta_1 GNPAR_{i,t-1} + \beta_2 RGDP_t + \beta_3 ROE_{i,t} + \beta_4 GBO_{i,t} + \beta_5 OPR_{i,t}$$
$$+ \beta_6 CDR_{i,t} + \beta_7 LR_t + \beta_8 CRAR_{i,t}$$
$$+ \varepsilon_{i,t} \tag{1}$$

Model 2:

$$GNPAR_{i,t} = \alpha_1 + \beta_9 GNPAR_{i,t-1} + \beta_{10} NPMC_t + \beta_{11} ROE_{i,t} + \beta_{12} GBO_{i,t} + \beta_{13} OPR_{i,t}$$
$$+ \beta_{14} CDR_{i,t} + \beta_{15} LR_t + \beta_{16} CRAR_{i,t} + \varepsilon_{i,t} \tag{2}$$

Model 3:

$$GNPAR_{i,t} = \alpha_1 + \beta_{17} GNPAR_{i,t-1} + \beta_{18} SLGC_t + \beta_{18} ROE_{i,t} + \beta_{20} GBO_{i,t} + \beta_{21} OPR_{i,t}$$
$$+ \beta_{22} CDR_{i,t} + \beta_{23} LR_t + \beta_{24} CRAR_{i,t} + \varepsilon_{i,t} \tag{3}$$

Model 4:

$$GNPAR_{i,t} = \alpha_1 + \beta_{25} GNPAR_{i,t-1} + \beta_{26} MCR_t + \beta_{27} ROE_{i,t} + \beta_{28} GBO_{i,t} + \beta_{29} OPR_{i,t}$$
$$+ \beta_{30} CDR_{i,t} + \beta_{31} LR_t + \beta_{32} CRAR_{i,t} + \varepsilon_{i,t} \tag{4}$$

Model 5:

$$GNPAR_{i,t} = \alpha_1 + \beta_{33} GNPAR_{i,t-1} + \beta_{34} NIFTY_t + \beta_{35} ROE_{i,t} + \beta_{36} GBO_{i,t} + \beta_{36} OPR_{i,t}$$
$$+ \beta_{38} CDR_{i,t} + \beta_{39} LR_t + \beta_{40} CRAR_{i,t} + \varepsilon_{i,t} \tag{5}$$

Model 6:

$$GNPAR_{i,t} = \alpha_1 + \beta_{41} GNPAR_{i,t-1} + \beta_{42} GFDR_t + \beta_{43} ROE_{i,t} + \beta_{44} GBO_{i,t} + \beta_{45} OPR_{i,t}$$
$$+ \beta_{46} CDR_{i,t} + \beta_{47} LR_t + \beta_{48} CRAR_{i,t} + \varepsilon_{i,t} \tag{6}$$

Model 7:

$$GNPAR_{i,t} = \alpha_1 + \beta_{49} GNPAR_{i,t-1} + \beta_{50} PSAR_{i,t} + \beta_{51} ROE_{i,t} + \beta_{52} GBO_{i,t} + \beta_{53} OPR_{i,t}$$
$$+ \beta_{54} CDR_{i,t} + \beta_{55} LR_t + \beta_{56} CRAR_{i,t} + \varepsilon_{i,t} \tag{7}$$