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ECONOMIC IMPLICATIONS OF STRESS IN ASSET QUALITY ON PERFORMANCE OF INDIAN ECONOMY: A CASE OF D-SIBS AS A WHOLE SUBSYSTEM

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Abstract: Post global financial crisis (2008), a new subsystem in Indian banking system had developed in the form of Domestic Systemically Important Banks(D-SIBs) as a whole since 2014 - A group of banks that are tagged Too Big To Fail and whose disorderly failure may cause failure of multiple banks- a kind of domino effect. Besides, the increasing number of Individual D-SIBs posing the problem of Too Many To Fail had also emerged in India. Therefore, in order to signify and highlight the role and importance of D-SIBs as a whole subsystem in entire Indian banking system and economy, the direct association between D-SIBs as a whole subsystem and Indian Economy had been investigated with the help of economic and financial data by tracing the economic implications of stress in asset quality of D-SIBs on the performance of Indian economy measured by GDP. For this, the study used autoregressive distributed lag model (0,1) based on the results of unit root test for period the spanning from 2000-01 to 2020-21 collected from secondary sources. In order to test the structural break, the study employed chow test. The results obtained from the ARDL approach (0,1) showed that stress in asset quality had negative effects on the performance of economy in the long run. This implied that D-SIBs as a whole subsystem displayed strong association with the Indian economy. This study made an appeal to the regulatory to pay special attention in this regard and suggested to treat differently not only individual domestic systemically important banks but also the problem of individual domestic systemically important banks in India. Unfortunately, individual domestic systemically important banks face differential treatment under Basel Norms III but not the problem of individual domestic systemically important banks in India.

Keywords: Economic Implications, Stress in Asset Quality, Domestic Systemically Important Bank, Gross Nonperforming Assets, ARDL

JEL Classification: G20, G28, G33

INTRODUCTION

Almost thirty years have passed since the implementation of financial sector reforms in India commenced with the recommendations of Narsimsham Committee I (1991),

despite the problem of stress in asset quality measured by non-performing assets still persists in New India. Also several strict measures have been placed in order to curb the problem of NPAs in India from SARFAESI Act to IBC Code under legal framework. However, the level of NPAs was not same across aforementioned period. NPAs experienced as a roller coaster ride across the period. Post global financial crisis (2008), a new subsystem in the Indian banking system has developed in the form of D-SIBs as a whole subsystem since 2014. This is a group of banks that are tagged Too Big To Fail and clubbed under the scheme of domestic systemically important banks in India. These are the banks that posed systemic risk and have the potential to cause significant disruption to the banking system and even to the real economy through the essential services they provide to the banking system and economy as it is believed that these services cannot be substituted easily. Hence the disorderly failure of these banks may cause failure of multiple banks while posing a kind of domino effect. On account of these special features, they enjoy government support at the time of distress or failure while posing moral hazard problem as they assume more risks. On the other hands, the increasing number of banks in the club of D-SIBs is also posing the problem of Too Many To Fail emerged in India besides Too Big To Fail. Therefore, in order to signify and highlight the role and importance of D-SIBs as a whole subsystem in entire Indian banking system and economy, the direct association between D-SIBs as a whole subsystem and Indian Economy is investigated with the help of economic and financial data by tracing the economic implications of stress in asset quality of domestic systemically important banks on the performance of Indian economy measured by gross domestic product (GDP). For this, the study uses autoregressive distributed lag model (0,1) based on the results of unit root test. The study employs GNPAs of D-SIBs as independent variables while GDP at current market price as dependent variable in natural log form to smoothen out data and remove any probable issue of Heteroscedasticty. The impact of GNPAs of D-SIBs on GDP is analyzed for period the spanning from 2000-01 to 2020-21 collected from secondary sources. In order to test the structural break, the study employs chow test.

Why D-SIBs instead of SCBs?

D-SIBs as a whole subsystem is selected because:-

- This subsystem constitutes 50 percent of total population of India as a customer base in the entire Indian banking system.
- This subsystem captures 40 percent of market size in terms of advances and deposits in the entire Indian banking system.
- This subsystem alone constitutes 25 percent of Gross Non-Performing Assets of Scheduled Commercial Banks in India.

- This subsystem is more susceptible to systemic risk in India.

Besides above, it is observed that NPAs among the determinants of positive systemic impact was positively related with positive systemic impact of a bank which means that the higher NPAs of a bank, the higher positive systemic impact of the bank and the lower shock absorbing capacity of the bank at a time of systemic shocks. This also helps to peer into the shocks absorbing capacity of a bank and has much policy implications.

About D-SIBs in India

Lessoning from global financial crisis (2008), the regulators around the World turned their attention to this issue and to the measures needed to address it while acknowledging the importance of macro prudential policies to preserve financial stability. A framework for dealing with systemically important financial institution was developed by Financial Stability Board (FSB) in 2010 and assessment methodologies thereon to assess the systemic importance of such banks in 2011 by Basel Committee on Banking Supervision (BCBS). The framework was simply extended in 2012 to deal with domestic systemically important banks that exert their influence on local economy. The framework entrusted local authorities with this responsibility, which are the best place to identify which banks are systemic within their borders. In response to the call, RBI issued a press release Framework for Dealing with Domestic Systemically Important Banks (D-SIBs) on July 22, 2014 comprising of complete methodology to identify domestic systemically important banks in India and predicted almost 4 to 6 banks might fall in this category[1]. Based on the modified methodology adopted by India[2], RBI issued a first list of banks identified as D-SIBs in August 2015 which included SBI and ICICI banks. HDFC bank was added to the list in 2017. The updated published list of D-SIBs is as follows which shows the allocations to buckets corresponding to the level of additional loss absorbency they would be required to meet.

Table 1: Updated list of D-SIBs identified in 2021 with their allotted buckets

Bucket	*Banks*	*Additional Common Equity Tier 1 requirement as a percentage of Risk Weighted Assets (RWAs)*
5	—	1.00 percent
4	—	0.80 percent
3	State Bank of India	0.60 percent
2	—	0.40 percent
1	ICICI Bank & HDFC Bank	0.20 percent

Sources: RBI releases 2021 list of Domestic Systemically Important Banks (D-SIBs) January 04, 2022

SURVEY OF ECONOMIC LITERATURE

The review of economic literature brings forth several useful perspectives regarding the study and provides the justification for the present study. It helps to identify the gap in the existing literature and lay the foundation for analyzing the interrelationship between stress in asset quality and performance of economy. For rationality and convenience, this is presented chronologically.

An asset can be classified into performing assets and non performing assets. An asset is said to be performing assets when it accrues income for the bank at regular interval whereas it becomes nonperforming assets when it ceases to generate income for the bank. It poses several economic implications not only on the performance of banks but also performance of economy. Muniappan, G.P. (2002) in his paper identified the implications of NPAs on banks as well as on economy and classified the implications of NPAs into quantifiable and non-quantifiable implications. In the implications of NPAs on banks, he illustrates that NPAs do not generate interest income for banks but at the same time, banks are required to make provisions for such NPAs from their current profit, thus, posing deleterious effect on return on assets in several ways such as through erosion of profits and interest income, limit recycling of funds, set in asset liability mismatches etc. led to the tendency to understate the level of NPAs. While discussing the implications of NPAs on economy, he illustrates that bank credit is the catalyst to the economic growth of the country and any bottleneck in the smooth flow of credit, one cause is for which is the mounting NPAs is bound to create adverse repercussions on the economy. The non-quantifiable implications can be psychological like Play Safe attitude and risk aversion and disinclination to take decisions. Gopalkrishan, T.V. (2005) in his book elaborated the effects of NPAs on banks as well as on the economy and observed that NPAs caused the banks to face loss of income on NPAs and its provisioning, ensure adequate capital, maintain reserve requirements, pay interest on deposits, incur legal & other miscellaneous expenses and maintain an image as if nothing had gone wrong with their inherent strengths. Hence the NPAs result in lower interest rates to depositors, higher intermediation cost, higher rate of interest to borrowers, higher rates of service charges to all customers and less return to share holders by way of dividend etc and all these costs are finally passed on to the government and forced to bail out the banks through budgetary provisions which implies that it is the tax payers who ultimately bear the cost of NPAs for no fault of theirs. On the other side, NPAs also cost the economy in several ways. According to him, money borrowed for investments, if not properly utilized affects creation of assets and growth of the economy, generation of employment, demand and supply for goods and services resulting in inflationary pressure and finally fiscal discipline of the nation. Fofack, H. (2005) observed that 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 and growth of the economy. Ramanadh, K. & Rajesham, Ch. (2013) in their study examined the growth in bank credit and NPAs of Indian Commercial Banks in relation to the growth of GDP for the period spanning from 1996-97 to 2010-11using the correlation analysis. The study observed that there was a positive and moderate correlation between expansion of credit and GDP growth rate during the study period but the relationship between GDP growth rate and NPAs of banks was either weak positive or negative correlation between the two. Thus they could not arrive at firm conclusion about the relationship between GDP growth rate and NPAs of banks. Shashidhar, M.L. (2014) in his study concluded that there was negative relationship between NPAs and GDP growth rate, credit growth rate and asset prices while in the case of relationship between NPAs and inflation rate, it was positive in the study period. There are ample of empirical findings and studies undertaken in different countries and mostly as panel that approved the inverse relationship between economic growth and NPLs (Brownbridge, M. 1998; Salas, V. & Saurina, J. 2002; Rajan, R. & Dhal, S.C. 2003; Fofack, H. 2005; Das, A & Ghosh, S. 2007; Bofondi, M. & Ropele, T. 2011; Louzis *et al.*, 2012; Messai, A.S. and Jouini, F. 2013; Prasanna *et al.*, 2014; Ghosh, A. 2015; Ekanayake, E.M. & Azeez, A.A. 2015; Das, A. and Ghosh, S. 2007; Reddy, K.S. 2015; Kjosevski and Petkovski, 2017; Jayaraman et.al. 2018; Mohanty et.al. 2019;).

Sharma (2018) in her informative paper addresses the basic question on what exactly the concept of DSIBs is and methodology to identify them as D-SIBs and how these banks are different from other banks along with what role they play in the development of the economy. Dash, M. (2019) in his article concluded that leverage, deposits, loan & advances, return on assets and nonperforming assets are the major determinants of positive systemic impact of banks in India and NPAs among the determinants of positive systemic impact was positively related with positive systemic impact of a bank which means that the higher NPAs of a bank, the higher positive systemic impact of a bank and the lower shock absorbing capacity of the bank at a time of systemic shocks. The implication of systemic impact is that if the systemic impact of a bank is negative, it implies that the bank has enough capital to absorb the systemic shocks and if it turns out be positive, it implies that the bank is undercapitalized and has not enough capital to absorb the systemic shocks.

Most of the studies have been undertaken in order to identify the determinant factors of stress in asset quality in India. The literature exhibits that these factors can be clubbed into two groups- Macroeconomic determinants and Bank specific determinants. Among the macroeconomic determinants, the most common significant determinants are Gross Domestic Product, Inflation rate and Credit growth rate (Swamy, 2012; Jayaraman et.al. 2018; Mohanty et.al. 2019). None of studies focuses on the direct

linkage between stress in asset quality and performance of economy in context of D-SIBs as a whole subsystem in India. The study employs GNPAs and GDP as proxy variables for stress in asset quality and performance of economy respectively.

RESEARCH METHODOLOGY & DATABASE

In order to examine the impact of GNPAs of D-SIBs in India over the period commencing from 2000-01 to 2020-21, GDP at current market price at series 2011 is taken as dependent variables. Splicing method is used to generate back series data suggested by NSO. For missing values, the technique of interpolation is used wherever needed. The sources of data are database on Indian economy and annual reports of SBI, ICICI & HDFC banks. All the variables are expressed in natural log form to smoothen out the data and remove any probable issue of Heteroscedasticty problem besides the analysis and elasticity interpretation purpose. To find the relation between dependent and independent variables, the study assumes direct functional relationship between them as follows:

Model: GDP = f (GNPADSIBs)

In context of the present study, the unit root test results presented in **Table 2** show that lnGDP is integrated of order zero [I (0)] while the lnGNPADSIBs is integrated of order one [I(1)] paving the way for applying autoregressive regressive distributed lag (ARDL) model developed by Pesaran et.al.(2001).

Table 2: Unit Root Test Results using DF/ADF test

Variable	*Levels*	*Ist differences*	*Order of Integration*
lnGDPt	-2.517 (0.0114)[a**]	————	I(0)
lnGNPADSIBt	-0.424 (0.9060)	-3.475 (0.0087)**	I(1)

Sources: Author's calculation using STATA based on data collected from DBIE & Annual Reports of Banks

Note: Critical values are -3.750, -3.00 and -2.63 at 1, 5 and 10 percent level of significance.

** indicates 5 percent level of significance.

a** & b** indicate significant at 5 percent level of significance with drift.

Based on the study objectives, it is a better model than others to capture the short and long run impact of GNPAs on GDP. This model is also capable of generating the short and long run elasticities for a small sample size at the same time and follows the ordinary least square approach for co-integration between the variables (Duasa, 2007). A dynamic error correction model (ECM) can be derived from ARDL through a simple linear transformation. Likewise, the ECM integrates the short-run dynamics with the

long-run equilibrium without losing long-run information and avoids problems such as spurious relationship resulting from non-stationary time series data. Since Johansen co-integration test cannot be applied in case of mixed order of integration or all non-stationary, as this method requires all the variables to be integrated of I(1). Instead, the bounds F-statistic are used to compare with lower and upper bound critical values (Pesaran & Shinn 1999). The study used lower and upper bound critical values calculated by Narayan (2005) for small samples on account of the lower and upper bound critical values calculated by Pesaran et.al. (2001) are suitable only for large and medium sample size. The bounds testing within the ARDL context involves dynamic specification. The period lagged values of the dependent and independent variables are used on the right hand side of specification. The equation for above given functional form can be written in ARDL form as follows:

$$\Delta \ln GDP_t = \alpha_0 + \Sigma_{k=1}^{n} \alpha_k \Delta \ln GDP_{t-k} + \Sigma_{k=1}^{n} \beta_k \Delta \ln GNPADSIB_{t-k} + \gamma_1 \ln GDP_{t-1} + \delta_1 \ln GNPADSIB_{t-1} + \in_t$$

Where α_0 represents drift component and $\in_t$ shows the white noise error term while Δ is first difference operator indicating the short run dynamics. The lagged variables are used to capture the long run relationship between the variables. The null hypothesis (H_o: $\gamma_i = \delta_i = 0$) is tested in opposition to the alternative hypothesis ($H_1 : \gamma_i \neq \delta_i \neq 0$) for each equation. If the null proposition of zero long-run co-integration is rejected, the presence of the long-run relationship is ensured. After confirming long run co-integration between the variables, the ECM general form corresponding to the above equation would be formulated as below:

Equation: $$\Delta \ln GDP_t = \alpha_0 + \Sigma_{k=1}^{n} \alpha_k \Delta \ln GDP_{t-k} + \Sigma_{k=1}^{n} \beta_k \Delta \ln GNPADSIB_{t-k} + \phi ECT_{t-1} + \upsilon_t$$

Where Δ is first difference operator indicating the short run while ? is the coefficient of error correction term (ECT) for short run dynamics. The coefficient of ECT shows the speed of adjustment in the long run equilibrium if any deviation takes place after disturbance in the short run.

Before applying the ARDL bound test for checking co-integration exists or not among $\ln GDP_t$, and $\ln GNPADSIB_t$, it is pre-requisite to select an appropriate lag order of the variable after dynamic specification of ARDL form. The study employed the optimal lag order of the vector autoregression (VAR) model for the selection of appropriate lag order. The study has chosen the optimal lag length proposed by more than one selection order criteria. The results of selection of appropriate lag order for lnGDPt, and lnGNPADSIBt, are shown in the **Appendix I** while summary of optimal lag length is provided in the **Table 3.**

Table 3: Summary of Optimal Lag Length for $lnGDP_t$ and $lnGNPADSIB_t$

Variables	*Optimal lag*
lnGDPt,	2 (See Table 3A Appendix I)
lnGNPADSIBt	1 (See Table 3B Appendix I)

Sources: Author's own calculation based on results obtained from using STATA

From the Table 3, it is observed that the optimal lag length of lnGDPt, and lnGNPADSIBt are two, one and three respectively with the allowance of maximum lag order four.

After selecting appropriate lag length of the variables, it is important to use the ARDL bound test for the confirmation of co-integration (Pesaran et.al. 2001). The study obtained the results of Bound F test using ARDL approach shown in the Table 4 under Section Results & Discussion. The study also employed the Granger Causality Walt test in order to know direction of causality at least in one direction whose results are shown in the Table 5 under Section Results & Discussion. After ensuring causality and finding the long run association existing between the variables from the Table 4 & Table 5, the study uses the error correction model to find the short run dynamics whose estimated results are shown in the Table 6 under Section Results & Discussion. Thereafter all the diagnostic tests are conducted and shown in the Table 6A.

RESULTS & DISCUSSION

The study obtained the results of Bound F test using ARDL approach shown in the Table 4 which confirms the long run association existing between the variables. The estimated results shown in Table 4 portray that the value of F-statistics is larger than

Table 4: Results of Bounds F test using ARDL (0, 1) Approach

Equation	*Calculated F Statistic*		*Probability Value > F*	
Equation : $lnGDP_t$ & $lnGNPADSIB_t$	*F(5,12) = 5.65*		*0.0066*	
Significance Level	*Pesaran et. al.(2001)[a]*		*Narayan (2005)[b]*	
	Critical Values			
	Lower Bound	*Upper Bound*	*Lower Bound*	*Upper Bound*
1 percent	3.74	5.06	4.400	5.646
5 percent	2.88	4.01	3.152	4.156
10 percent	2.45	3.52	2.622	3.506

Note: [a]Critical values are obtained from Pesaran et.al. (2001, Table CI (iii) Case III: Unrestricted intercept and no trend, p.300

[b]Critical values are obtained from Narayan (2005, Table Case III: Unrestricted intercept and no trend, p.10.

lower and upper bound cririca values given by both Pesaran et.al. (2001) and Narayan (2005) at 1 percent significance level for all the equations confirming the relationship among lnGDPt and lnGNPADSIBt. Hence, the alternative hypothesis of co-integration is accepted and the ARDL bound test approves the existence of long-run association among lnGDPt and lnGNPADSIBt.

The study also employed Granger Causality Wald test in order to know the direction of causality at least in one direction whose results are shown in the **Table 5.**

Table 5: Granger Causality Wald tests using VAR

Granger Causality Wald tests using VAR				
Dependent	*Excluded*	*Chi²*	*d.f.*	*Prob > Chi²*
lnGDPt	lnGNPADSIBt	11.105	2	0.004
lnGNPADSIBt	lnGDPt	1.9532	2	0.377

Sources: Author's own calculations based on data taken from DBIE & Annual reports of SBI, ICICI & HDFC bank

After ensuring causality and finding the long run association existing between the variables from the **Table 4** & **Table 5**, the study uses the vector error correction model to find the short run dynamics whose results are shown in the **Table 6**. The estimated equation of the long run relationship between $lnGDP_t$ *&* $lnGNPADSIB_t$ is given below in the **Table 6** while the results of the diagnostic test are given below in the **Table 6A.**

Table 6: Results from ARDL (0,1) Approach

Dependent variables: $d.lnGDP_t$				
No. of observation = 18	F(5,12) = 5.65 Prob > F = 0.00	R^2 = 0.9640	Adj R^2 = 0.9501	
Short run estimates		Coef.	t	P>t
$d.lnGDP_{t-1}$		0.8678013	2.38	0.033
$d.lnGDP_{t-2}$		-0.4584123	-1.35	0.200
$d.lnGNPADSIB_{t-1}$		0.062166	1.86	0.086
Long run estimates				
$lnGDP_{t-1}$		0.0299612	2.52	0.026
$lnGNPADSIB_{t-1}$		-0.0387705	-2.58	0.023
Vector Error Correction Model (VECM)				
No. of observation = 17	F(4,13) = 92.89	Prob > F = 0.00	R^2 = 0.9662	Adj R^2= 0.9558
		Coef.	t	P>t
$d.lnGDP_{t-1}$		1.887932	5.50	0.000
$d.lnGDP_{t-2}$		- 0.955931	-2.83	0.014
$d.lnGNPADSIB_{t-1}$		0.0249329	0.84	0.415
ECT_{t-1}		-0.9840004	-2.42	0.031

Sources: Author's own calculations based on data taken from DBIE & Annual reports of SBI, ICICI & HDFC bank

The result indicates the direct positive associations between GNPAD-SIB and GDP in the short run while the direct inverse association between GNPADSIB and GDP in the long run. The estimated long run coefficient of GNPADSIB (-0.0388) indicates when growth in GNPADSIB rises by one percent, GDP growth rate decreases by 0.0388 percent in the long run. The negative association between GNPADSIB and GDP in the long run indicates that when improvement in asset quality takes place, that is, NPA declines, it improves the profitability and productivity of banks which in turn improves the performance of banks and consequently leads to increase in credit growth and hence the growth of the economy. It is because of the reason that strict measures and speeding up of resolution process of NPA reduces NPA and frees up resources from the tag of NPA and becomes available for banks for extending credit and investment purposes, it leads to the credit growth and consequently growth of the economy. On the other hand, when deterioration in asset quality takes place, that is, NPA rises; it reduces the profitability and productivity of banks which in turn affect the performance of banks and consequently leads to decrease in credit growth and growth of the economy. GNPAD-SIB has direct negative impact on GDP in the long run while it has direct positive impact on GDP in the short run. It shows that the relationship between GNPAD-SIB and GDP may differ from the short run to long run and there exists direct association among them. The estimated coefficient of error correction term shows that if any deviation takes place from the long run equilibrium due to the disturbance in the short run, it will correct disequilibrium by 98.40 percent in each period in order to restore the long run equilibrium between GNPADSIB and GDP.

Table 6A: Results of Diagnostic tests

Diagnostic Test for Equation: $lnGDP_t$ & $lnGNPADSIB_t$			
Normality of U_{it} H_0: U_{it} is normally distributed [0,1]	Shapiro-Wilk W test for normal data Prob>z = 0.53185		
Autocorrelation Test H_0: No serial correlation	D.W. statistics	BG LM test	Durbinalt
	1.95 (6,18)	1.866 (0.1719)	1.273 (0.2593)
R^2 = 0.9640	No. of observation = 18		
Heteroscedasticty test H_0: Constant variance	BP/CW test Prob>X^2= 0.1673		
Omitted Variable test H_0: Model has no omitted variables	Ramsey RESET test using powers of the fitted values of dependent variable Prob > F (3,9) = 0.23		

Number of obs.= 21	* indicates 1 percent Level of Significance. ** indicates 5 percent Level of Significance. *** indicates 10 percent Level of Significance.	1. (..) exact probability value of the test 2. I (0) & I (1) represent underlying series integrated of order 0 & 1 respectively.

Sources: Author's own calculations based on data taken from DBIE & Annual reports of SBI, ICICI & HDFC bank

Table 6A reports the diagnostic tests for equation carried out for assessing reliability of the empirical model. The estimated value of R square and adjusted R square is greater than 70 percent showing the model is a good fit. The Lagrange Multiplier (LM) test shows that the null proposition of no serial correlation could not be rejected. Results of Shapiro-Wilk test for normality revealed that the residuals were normally distributed with zero mean and constant variance. The projected Ramsey reset test Ramsey reset) illustrates that the functional form of the estimated model is correct. Similarly, the expected result of BP shows that there is no Heteroscedasticty problem in the model. Thus, it can be concluded that the ARDL (0, 1) model applied in the analysis was reliable.

Table 7: Result of Chow Statistic

Chow Statistic	H_0: There is no structural break at 2013-14.	
	F(2, 17) = 2.73	Prob > F = 0.10

Sources: Author's own calculations based on data taken from DBIE & Annual reports of SBI, ICICI & HDFC bank

The result of chow statistic presented in **Table 7** shows that the null hypothesis cannot be rejected at 10 percent level of significance. This implies that there is no structural break in parameters of GNPAs of D-SIBs at 2013-14 but the possibility of structural break after 2013-14 cannot be denied which requires further investigation.

CONCLUSION & POLICY IMPLICATIONS

In order to signify and highlight the role and importance of D-SIBs as a whole subsystem in entire Indian banking system and economy, the direct association between D-SIBs as a whole subsystem and Indian Economy is analyzed with the help of economic and financial data by tracing the economic implications of stress in asset quality of D-SIBs on the performance of Indian economy measured by GDP. The results obtained from the ARDL approach (0,1) show that there exists the direct positive associations between GNPA and GDP in the short run while the direct inverse association between GNPA and GDP in the long run in case of D-SIB. Thus the present study support the hypothesis that GNPA and GDP are direct negatively associated, that is, the high NPAs affect the profitability and productivity of banks which in turn negatively affect the credit growth and consequently to the growth of the economy and *vice versa*.

It is also observed that GNPAs of D-SIBs have negative effects on the performance of economy in the long run. This implies that D-SIBs as a whole subsystem display strong association with the Indian economy. This study makes an appeal to the regulatory

to pay special attention in this regard and suggests treating differently not only individual domestic systemically important banks but also the problem of individual domestic systemically important banks in India. Unfortunately, individual domestic systemically important banks face differential treatment under Basel Norms III but not the problem of individual domestic systemically important banks in India.

AUTHORS' CONTRIBUTION

This study contributes primarily in the field of macro-sub-financial linkages in context of D-SIBs as a whole subsystem in India while acknowledging the causality running from financial to real sector in context of India, thus, in the finance-growth nexus.

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DECLARATION OF CONFLICTING INTEREST

We hereby declare that there is no conflict of interest.

NOTES

1. RBI releases Framework for dealing with Domestic Systemically Important Banks (D-SIBs) July 22 2014 Reserve Bank of India - Press Releases (rbi.org.in) Available at Reserve Bank of India - Database (rbi.org.in)
2. For more details about scheme see; RBI releases Framework for dealing with Domestic Systemically Important Banks (D-SIBs) July 22 2014 Reserve Bank of India - Press Releases (rbi.org.in) Available at Reserve Bank of India - Database (rbi.org.in)

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APPENDIX I

Table 3A: Selection-order Criteria for $lnGDP_t$

Lag	*LL*	*LR*	*df*	*p*	*FPE*	*AIC*	*HQIC*	*SBIC*
0	-15.6004				0.412818	1.95299	1.95786	2.002
1	34.1125	99.426	1	0.000	0.00134	-3.77794	-3.7682	-3.67992
2	**38.149**	**8.0729***	**1**	**0.004**	**0.00094***	**-4.13518***	**-4.12056***	**-3.98814***
3	38.2952	0.29236	1	0.589	0.001045	-4.03473	-4.01524	-3.83868
4	40.0526	3.5148	1	0.061	0.000965	-4.12383	-4.09947	-3.87877

No. of Obs. = 17 Sample: 5 - 21 Endogenous: lnGDPt Exogenous: _cons

Table 3B: Selection-order Criteria for $lnGNPADSIB_t$

Lag	*LL*	*LR*	*df*	*p*	*FPE*	*AIC*	*HQIC*	*SBIC*
0	-24.2097				1.13668	2.96585	2.97072	3.01487
1	**1.14454**	**50.709**	**1**	**0.000**	**0 .06482***	**0.100642***	**0.110386***	**0.198667***
2	1.33423	0.37938	1	0.538	0.071492	0 .195973	0.210589	0.343011
3	1.40041	0.13236	1	0.716	0.080214	0 .305834	0.325322	0.501884
4	3.3891	3.9774*	1	0.046	0.072045	0 .189518	0.213877	0.43458

No. of Obs. = 17 Sample: 5 - 21 Endogenous: lnGNPADSIBt Exogenous: _cons

*Represents the criterion selecting the lag order. LR, FPE, AIC, SIC, and HQIC represent the sequential modified LR test statistic, final prediction error, Akaike information criterion, Schwarz information criterion, and Hannan–Quinan information criterion, respectively.