A Study of Determinants and Their Impact on Bank Debt Restructuring in Indian Banks

Tabassum [1]
Sarveshwar Pande [2]

Abstract

This research investigated the determinants and their impact on the bank debt restructuring in Indian banks, especially public sector banks, from 2008 – 2018. It analyzed the impact of gross advances and gross non-performing assets (NPAs) on the total number of restructured debts of the sampled banks. Panel data regression modeling was applied, where the Fixed Effect Model (FEM) was used as an estimation method. Granger causality test and Pearson correlation analysis were also employed. The results confirmed that gross NPAs and gross advances were highly statistically significant and positively impacted the total number of restructured loans at 5% and 1% significance levels, respectively. It was also confirmed that all the years jointly and each year individually had a significant time-fixed effect on the total number of restructured debts.

Keywords : **bank debt, bank debt restructuring, corporate debt restructuring, determinants, Fixed Effect Model, Hausman test, Indian public sector banks, non-performing assets, panel data modeling, restructuring**

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Bank debt restructuring is the best tool to mitigate financial distress in banks. This state of economic stress in the banks is mainly because of the stressed loans or non-performing assets (NPAs). As per the Reserve Bank of India (2015) :

> A non-performing asset (NPA) is a loan or an advance where interest and/ or installment of principal remain overdue for a period of more than 90 days in respect of a term loan….. An asset, including a leased asset, becomes non-performing when it ceases to generate income for the bank. (p. 1)

Increasing NPAs impose huge stress on the banks' balance sheets, which not only negatively impact the banks' productivity but also hamper economic growth (Otašević, 2015). Hence, the banking authorities restructured these stressed loans or non-performing assets to save the banks from financial distress. As per the Reserve Bank of India (2018), "Restructuring is an act in which a lender, for economic or legal reasons relating to the borrower's financial difficulty, grants concessions to the borrower" (p. 2). Bank debt restructuring involves amendments in

[1] *Research Scholar,* Amity Business School, Amity University Uttar Pradesh, Lucknow Campus, Malhaur, Lucknow - 226 010, Uttar Pradesh. (Email : tabassumhashimi39@gmail.com) ; ORCID iD : https://orcid.org/0000-0003-4839-2958

[2] *Assistant Professor,* Amity Business School, Amity University Uttar Pradesh, Lucknow Campus, Malhaur, Lucknow - 226 010, Uttar Pradesh. (Email : spande@lko.amity.edu) ; ORCID iD : https://orcid.org/0000-0002-6646-3898

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the provisions and conditions of loans given to the borrowers like modification in the repayment period, repayable amount, interest rate, installments, permitting extra credit facility, enhancing current credit limits, etc. Bank debt restructuring is very effective in reshaping and improving the bank-borrower credit relationship. It also helps in dealing with and alleviating the problem of NPAs.

As per the latest report by the Reserve Bank of India (2019), the gross NPAs in Indian public sector banks increased from 2.2% in 2007 – 08 to 14.6% in 2017–18, which was comparatively higher than it was in the other categories of Indian banks. Hence, the bank debt restructuring in Indian public sector banks is comparatively higher than in other Indian bank categories (Reserve Bank of India, 2020). In the past research studies, bank debt restructuring has been studied from various aspects, but there are negligible research studies on the factors and their impact on bank debt restructuring in Indian banks, especially public sector banks where the bank debt restructuring is comparatively higher than it is in other categories of Indian banks. Hence, this study attempts to fulfill this research gap in the existing studies.

This research covers the bank debt restructuring in the Indian public sector banks from 2008 – 2018. The main objectives of this research are to examine the impact of gross NPAs and gross advances on the total number of restructured debts in the sampled banks ; to analyze the time-fixed effect of all the years jointly on the total number of restructured debts in the sampled banks ; to analyze the time-fixed effect of each year individually on the total number of restructured debts in the sampled banks; and to frame a panel regression model representing the empirical relationship of a total number of restructured debts with gross NPAs and gross advances in the sampled banks. This research contributes to the existing literature in a threefold manner. Firstly, by using the latest econometric modeling techniques, it explores and analyzes the impact of gross NPAs and gross advances on the total number of restructured debts in the sampled banks. Secondly, it also observes how all the years jointly and each year individually has a time-fixed effect on the total number of restructured debts in the sampled banks. Thirdly, this research proposes the policymakers and bank regulators with some policy recommendations on bank debt restructuring for the Indian banks, especially public sector banks, so that stressed loans get resolved, and financial losses are minimized in the banking industry.

Literature Review

The existing literature is discussed in two divisions. The first part reviews the overview of the Indian banking system restructuring plan, while the other part examines the various research studies related to bank debt restructuring.

Overview of the Indian Banking System Restructuring Plan

As per the Reserve Bank of India (2018), "Restructuring is an act in which a lender, for economic or legal reasons relating to the borrower's financial difficulty, grants concessions to the borrower " (p. 2). It included a revision of terms and conditions of loans which covers modification in repayable sum, repayment period, interest rate, installments, improving current credit limits, permitting extra credit facility, etc. The primary objective of restructuring was to conserve the monetary value of units and resolving the issue of bad debts (RBI, 2015).

As per RBI (2015), the Reserve Bank of India (RBI) provided the guiding principles on the restructuring of debts that were classified into four broad groups such as guidelines for small and medium enterprises (SME), industrial units, industrial units under the Corporate Debt Restructuring (CDR) Mechanism, and remaining loans. The RBI promoted the CDR Mechanism in 2002 – 2003 as an institutional mechanism for banks to restructure stressed corporate loans and was provided especially only to the borrowers indulging in industrial activities (Ahamed & Mallick, 2017).

Besides the above categories for restructuring debts, there was also a scheme for Strategic Debt Restructuring (SDR). Sometimes, it was seen that even after the restructuring loans, the borrowing firms were unable to handle the distressed loans and cohere themselves to the restructuring conditions. Hence, the banks went for an option of change in ownership and initiated Strategic Debt Restructuring by changing debt dues to equity shares (RBI, 2015).

Review of Various Research Studies Related to Bank Debt Restructuring

Bank debt restructuring has been researched on various aspects, but there are negligible studies related to determinants and their impact on bank debt restructuring. Hence, various research studies related to bank debt restructuring on multiple aspects will be discussed briefly in this section.

Rybak and Puskov (2020) confirmed that restructuring was used to reduce NPAs, and hence, restructuring must be implemented systematically as per the regular norms and applied to all banks. Li et al. (2020) reported that the restructuring magnitude was positively correlated with financial market friction. Greenwood et al. (2020) examined the effect of pandemic COVID-19 on restructuring in U.S. firms. The findings confirmed that corporate debt restructuring had a moderate impact on the banks' balance sheets, and small firms were restructured rarely, but larger firms had various alternatives for restructuring.

Mo and Jiang (2020) confirmed that debt restructuring had enhanced the efficiency of investments in ventures with political links compared to ventures without political connections. Brooks (2020) examined how the sovereign debt restructuring experienced a swing in preferences of private creditors, while Piroska and Podvrsic (2020) examined how the bank restructuring in Slovenia was affected by the post-crisis European regulations. Kim et al. (2019) confirmed that equity issues could be used for recapitalizing current assets by the relocation of power or restructuring of loans. Wajid et al. (2019) helped understand the value foundation features of corporate restructuring measures, mainly via mergers. Joshi and Desai (2019) confirmed that during the pre and post-restructuring phase, the three economic factors had a significant difference, and the companies' operating performance in all the parameters excluding turnover was significantly affected by the restructuring.

Some researchers analyzed how firm investment was affected heterogeneously by debt restructuring (Jiang et al., 2019), while some researchers studied official debt restructuring (Cheng et al., 2018). Payne (2018) examined the debt restructuring mechanisms accessible to the economically stressed companies in the United Kingdom. Hoshi et al. (2018) examined the fall in the corporate restructuring activities in Japan, while Micucci and Rossi (2017) found that the chance of debt restructuring was more when the banks were placed near the borrowing company. Mamatzakis et al. (2016) concluded that technical efficiency in banks was negatively related to restructured loans and had a positive relationship with bankrupt loans. The cost of bank restructuring proceedings in E.U. countries was examined by Iwanicz - Drozdowska et al. (2016). Ahamed and Mallick (2017) examined the effect of the number of restructured debts on the bank risk in Indian banks and confirmed that a higher number of restructured loans reduced the risk-taking of Indian banks significantly. Some researchers investigated the nature of unsettled loan restructurings and confirmed that debt restructuring was significantly easier in traditional bank lenders than institutional lenders (Demiroglu & James, 2015).

Tumenbayeva (2012) concluded that restructuring permitted banks to deal with distressed loans and a considerable decrease in foreign debts, while Huang and Huang (2011) reported that stressed companies with stronger bank relations had more chances of restructuring their debts effectively. Pawlina (2010) found that the problem of underinvestment was aggravated if shareholders renegotiated debt in times of financial difficulty. Shi (2010) investigated how technical efficiency was affected by debt restructuring, corporatization, and privatization. Inoue et al. (2008) concluded that due to the delay in the implementation of the essential solutions, the private restructuring done by the stakeholders was not successful.

Research Gaps

In the past research studies, bank debt restructuring has been studied from various aspects, but there are negligible studies on the determinants and their impact on bank debt restructuring in Indian banks, particularly public sector banks where the bank debt restructuring is comparatively higher than the rest of the groups of Indian banks. Hence, this study attempts to fulfill this research gap in the existing studies.

Research Methodology

Sample and Explanation of Variables

This research aims to investigate the effect of gross NPAs and gross advances on the total number of restructured debts in the sampled banks and to analyze the time-fixed effect of all the years jointly and each year individually on the total number of restructured debts in the sampled banks. The sample includes all public sector banks of India. These sampled banks are Allahabad Bank, Andhra Bank, Bank of Baroda, Bank of India, Bank of Maharashtra, Canara Bank, Central Bank of India, Corporation Bank, Dena Bank, IDBI Bank Limited, Indian Bank, Indian Overseas Bank, Oriental Bank of Commerce, Punjab and Sind Bank, Punjab National Bank, State Bank of India, Syndicate Bank, UCO Bank, Union Bank of India, United Bank of India, and Vijaya Bank. The reason behind selecting such a sample is that public sector banks of India have comparatively more NPAs and restructuring of debts than other groups of Indian banks like foreign banks and private sector banks. The period of the research is from the year 2008 till 2018. The reason behind selecting this period from 2008 – 2018 is that post the global financial crisis 2007– 08, which was the spillover effect of the U.S. Subprime Crisis 2007– 08, there was an abrupt rise in the GNPA level from 2.2% in 2008 to 14.6 % in 2018 in public sector banks of India that can be attributed to the aftereffect of the global financial crisis 2007 – 08. Hence, simultaneously restructuring of debts also increased in Indian public sector banks from 14951.98 crores in 2008 to 257863.16 crores in 2018 that can also be attributed to the consequences of the global financial crisis 2007 – 08 (RBI, 2020). Annual data related to restructured debts, gross advances, and gross NPAs as the percentage of gross advances for all these sampled banks is analyzed, which were gathered from the *Handbook of Statistics on Indian Economy* derived from the database of RBI. The description of the variables used is given in Table 1.

Table 1. ***Description of the Variables Used and Their Sources***

Variables	Description	Sources
RESD	Total restructured debt in million	*Handbook of Statistics on Indian Economy (2019)*
GNPA	Gross non-performing assets as % of gross advances	*Handbook of Statistics on Indian Economy (2019)*
GA	Gross advances in million	*Handbook of Statistics on Indian Economy (2019)*

Methodology

Panel data that is in a strongly balanced form is used in this study. The panel data model called the fixed effect model (FEM) is employed as an estimation method with within effect estimators or fixed effect estimators. Hausman test is employed to choose the best-fitted model between the fixed effect model and random effect model. The time dummy is added to the FEM to verify the time fixed effect of each year individually. Testparm test is also used that is a joint test for time-fixed effect, which confirms that all the years jointly have a significant

time-fixed effect on the explained variable or not. Breusch – Pagan Lagrange multiplier test is also used to verify the occurrence of the random effect in the model, which helps choose the appropriate model between pooled OLS regression and random effect model. Other diagnostic tests are also used, like testing for serial-correlation and heteroskedasticity, and are taken care of before confirming the final model to avoid spurious regression results. The modified Wald test for groupwise heteroskedasticity in a fixed effect regression model and the Wooldridge test for autocorrelation are applied to verify heteroskedasticity and serial-correlation in the model, respectively. Variance inflation factor (VIF) is applied to confirm multicollinearity that is also taken care of if present. Before applying the final panel regression model, Pearson's correlation analysis and Granger causality test are also used. Pearson's correlation is applied to observe the strength and direction of the association between the included variables. The Granger causality test is employed to confirm the causal relationship among the included variables. Finally, a panel data regression model, known as the fixed effect model (FEM), is used. STATA 14.0 version, EVIEWS 9.0 version, and M.S. Excel are used in the analysis.

Model Specification

In the fixed effect model, the unobserved heterogeneity (μ_i) accounts for all those unobservable omitted variables, which are time-invariant but vary with the cross-sectional units and are not incorporated in the model. In FEM, correlation is found between the observable regressors and unobserved heterogeneity (μ_i), which specifies that the covariance between the observable regressors and the unobserved heterogeneity (μ_i) is not equal to zero. In FEM, μ_i is regarded as the fixed parameter to be estimated (Baltagi, 2005). The μ_i is known as a firm-fixed effect or individual fixed effect (Wooldridge, 2001).

The equations (1) and (2) for FEM are given below :

$$Y_{it} = \alpha_{it} + \beta'_{it} X_{it} + \mu_i + v_{it} \quad \text{.....(1)}$$

$$Y_{it} = \alpha_{it} + \beta_{1it} X_{1it} + \beta_{2it} X_{2it} + \beta_{3it} X_{3it} + ... + \beta_{kit} X_{kit} + \mu_i + v_{it} \quad \text{.....(2)}$$

In the context of this research, the model has been specified as under using equation (3) :

$$RESD_{it} = \alpha_{it} + \beta_{1it} GA_{it} + \beta_{2it} GNPA_{it} + \mu_i + v_{it} \quad \text{.....(3)}$$

where,

$i = 1, 2 \ldots N$ (no. of banks),

$t = 1, 2 \ldots T$ (time periods),

i = index of sampled banks = 1 to N,

t = time-interval,

Y_{it} = dependent variable or explained variable,

X_{it} = regressor or independent variable or explanatory variable,

α_{it} = constant or intercept term for the sampled bank i in year t,

$\beta' = K*1$,

K = total no. of regressors,

β_{1it} = coefficient of gross advances for the sampled bank *i* in year *t*,

β_{2it} = coefficient of gross non-performing assets for the sampled bank *i* in year *t,*

$GNPA_{it}$ = gross non-performing assets for the sampled bank *i* in year *t,*

GA_{it} = gross advances for the sampled bank *i* in year *t,*

$RESD_{it}$ = total restructured debts for the sampled bank *i* in year *t,*

μ_i = firm fixed effect or individual fixed effect or unobserved time-invariant individual-specific effect or unobserved heterogeneity,

v_{it} = idiosyncratic errors or purely white noise error term.

Hypotheses

The hypotheses which are formulated and tested are as follows :

- **H01 :** There is no significant effect of gross advances on the total number of restructured debts.
- **Ha1 :** There is a significant effect of gross advances on the total number of restructured debts.

- **H02 :** There is no significant effect of gross NPAs on the total number of restructured debts.
- **Ha2 :** There is a significant effect of gross NPAs on the total number of restructured debts.

- **H03 :** There is no significant time-fixed effect of all the years jointly on the total number of restructured debts.
- **Ha3 :** There is a significant time-fixed effect of all the years jointly on the total number of restructured debts.

- **H04 :** There is no significant time-fixed effect of each year individually on the total number of restructured debts.
- **Ha4 :** There is a significant time-fixed effect of each year individually on the total number of restructured debts.

- **H05 :** The final panel regression model is not significant and unacceptable.
- **Ha5 :** The final panel regression model is significant and acceptable.

Analysis, Findings, and Discussion

Descriptive Statistics

Descriptive statistics summarize the variables employed in the research, like the number of observations, maximum value, minimum value, standard deviation, and mean, which are represented in Table 2.

It is observed that the overall mean of restructured debts is 101,039 million, and its maximum value is 712,287 million, while the minimum value is 0. The overall mean of gross advances is 1,894,131 million, and its maximum value is 2.05e+07 million, while the minimum value is 184,090 million. The overall mean of gross NPAs is 5.802641%, and its maximum value was 27.95% in 2018 of IDBI Bank Limited, while the minimum value was 0.63% in 2010 of Punjab and Sind Bank.

Table 2. ***Descriptive Statistics***

Variable		Mean	Std. Dev.	Min	Max	Observations
RESD	Overall	101039	118399.8	0	712287	*N* = 231
	Between		77044.96	19781.09	373179.6	*n* = 21
	Within		91327.22	–257926.6	440146.4	*T* = 11
GA	Overall	1894131	2468466	184090	2.05e+07	*N* = 231
	Between		2163986	583462.3	1.07e+07	*n* = 21
	Within		1270469	–4593588	1.17e+07	*T* = 11
GNPAs	Overall	5.802641	5.579466	.63	27.95	*N* = 231
	Between		1.557406	3.486364	8.798182	*n* = 21
	Within		5.367531	–1.365541	26.17719	*T* = 11

Table 3. ***VIF Values for Explanatory Variables***

	VIF	1/VIF
GA	1.018	.983
GNPA	1.018	.983
Mean VIF	1.018	

Test for Multicollinearity

To verify the multicollinearity problem, the variance inflation factor (VIF) is employed. According to the thumb rule of 10, the VIF must not be higher than 10 as if the value of VIF is 10, then there will be a critical level of multicollinearity issue present in the model, which must be taken care of by eliminating the problematic variable from the regression model (Miles, 2014 ; O'Brien, 2007). Table 3 shows the value of VIF for explanatory variables used in the study. In Table 3, it is noticed that the VIF value of both the explanatory variables is 1.018, and the mean VIF value is also 1.018. Hence, there is no multicollinearity problem in the model.

Test for Heteroskedasticity

Modified Wald test for groupwise heteroskedasticity in a fixed effect regression model is used to confirm the occurrence of heteroskedasticity, and its outcome is depicted in Table 4. Table 4 confirms that the *p*-value is 0.0000 in the applied test, which is highly statistically significant at a 1% significance level, and the null hypothesis that favors homoskedasticity is rejected. This outcome verifies the existence of heteroskedasticity in the residuals, which must be taken care of in the execution of the final regression model.

Table 4. ***The Outcome of the Modified Wald Test for Groupwise Heteroskedasticity***

Test	*p*-value	Findings
Modified Wald test for groupwise heteroskedasticity in a fixed effect regression model	0.0000	1. At the 1 % significance level, the *p*-value is highly statistically significant. 2. Heteroskedasticity present.

Test to Confirm Serial Correlation

The Wooldridge test for autocorrelation is used to verify the occurrence of autocorrelation in the panel regression model. The result of this test is given in Table 5. Table 5 verifies that the *p*-value is 0.0029, which is highly statistically significant, and the null hypothesis that supports no autocorrelation in the model is rejected at a 1% significance level. This outcome confirms the occurrence of serial correlation in the model that must be taken care of in the execution of the final regression model.

Table 5. ***Result of Wooldridge Test for Autocorrelation***

Test	*p*-value	Findings
Wooldridge test for autocorrelation	0.0029	1. At the 1% significance level, the *p*-value is highly statistically significant. 2. Serial correlation or autocorrelation present.

Pearson's Correlation Analysis

Pearson's correlation matrix gives the direction and intensity of the association between the variables employed in the research. Table 6 shows the outcome of the correlation analysis. Table 6 gives the outcome of the correlation analysis, which states that RESD and GA have a positive correlation with each other and have a positive coefficient of 0.817. This implies that an increase in gross advances (GA) increases the restructuring of debts. The outcome also reports that RESD and GNPA have a positive coefficient of 0.232, implying that a rise in the gross NPAs increases the restructuring of loans or restructured debts. It is also found that GA and GNPA have a positive coefficient of 0.131, which implies that an increase in the gross advances (GA) increases the gross NPAs.

Table 6. ***The Outcome of Correlation Analysis***

Variables	(1)	(2)	(3)
(1) *RESD*	1.000		
(2) *GA*	0.817	1.000	
(3) *GNPA*	0.232	0.131	1.000

Granger Causality Test

The causality between the two variables used in the research is investigated through the Granger causality test. The results of this test are given in Table 7. The outcome in Table 7 shows that gross advances (GA) Granger causes a restructuring of debt (RESD) as the *p*-value is 0.0000, which is highly statistically significant at a 1% significance level. Hence, the null hypothesis is rejected, which states that GA does not Granger cause RESD. This implies that gross advances cause restructuring of debt. Similarly, restructuring of debt (RESD) Granger causes gross advances (GA) as the *p*-value is 0.0000 at a 1% significance level, which is highly statistically significant. Hence, the null hypothesis is rejected, which states that RESD does not Granger cause GA. This signifies that the restructuring of debt also affects gross advances. It is also observed that GNPA Granger causes a restructuring of debt (RESD) as the *p*-value is 0.0033 that at a 1% significance level is highly statistically significant, and the null hypothesis is rejected, which states that GNPA does not Granger cause RESD. This implies that gross NPAs impact the restructuring of debt. But RESD does not Granger cause GNPA as the *p*-value is 0.1194 at a 5%

Table 7. ***The Outcome of the Granger Causality Test***

Null Hypothesis:	Obs	*F*-Statistic	Prob.
GA does not Granger cause *RESD*.	189	27.3431	4.E-11
RESD does not Granger cause *GA*.		23.9947	5.E-10
GNPA does not Granger cause *RESD*.	189	5.90037	0.0033
RESD does not Granger cause *GNPA*.		2.14986	0.1194
GNPA does not Granger cause *GA*.	189	11.8041	2.E-05
GA does not Granger cause *GNPA*.		0.33641	0.7148

significance level, which is insignificant, and the null hypothesis is not rejected, which states that RESD does not Granger cause GNPA. It is also confirmed that GNPA Granger causes GA as the *p*-value is 0.0000, which is highly statistically significant at a 1% significance level. The null hypothesis is rejected, which states that GNPA does not Granger cause GA. But GA does not Granger cause GNPA as the *p*-value is 0.7148 that at a 5% significance level is insignificant, and the null hypothesis is not rejected, which states that GA does not Granger cause GNPA.

The Fixed Effect Model

The Hausman test is employed to confirm if the correlation is present between the observable explanatory variables and unobserved heterogeneity or effect (μ_i). This test is employed to choose the best-suited model for panel data between the fixed effect model (FEM) and the random effect model (REM). Table 8 gives the outcomes of this test.

Table 8 confirms the outcome of the Hausman Test, which states that observable explanatory variables or regressors and unobserved heterogeneity or effect (μ_i) are correlated as the *p*-value is 0.0000 at a 5% significance level, which is highly statistically significant. Therefore, the alternative hypothesis that favors the fixed effect model as the more appropriate model over the random effect model is accepted at a 5% significance level. It also implies that individual fixed effects are there in the model. Therefore, the final model will be the Fixed Effect Model.

When it is confirmed that individual fixed effects are there in the model and the final model is the Fixed Effect Model, the presence of a time-fixed effect will also be checked in the model in two ways. Firstly, by using the time dummy of each year in the FEM to see each year's fixed effect individually on the total restructured loans. Secondly, by using the Testparm test, which is a joint test for the time-fixed effect that confirms whether all the

Table 8. ***The Outcome of the Hausman Test***

Test	*p*-value	Findings
Hausman test	0.0000	1. The *p*-value is highly statistically significant at the 5% significance level. 2. Observable explanatory variables or regressors and unobserved heterogeneity or effect (μi) are correlated. 3. There are individual fixed effects present. 4. The fixed effect model is a more suitable model than the random effect model.

Table 9. ***The Outcome of the Testparm Test***

Test	*p*-value	Findings
Testparm test	0.0000	1. *p*-value is highly significant at the 1 % significance level. 2. The alternate hypothesis favoring the presence of time-fixed effects of all years on total restructured loans is accepted. 3. The dummies for all years jointly are not equal to 0. 4. There are time-fixed effects present jointly of all years on the total number of restructured loans. 5. All the years jointly have a significant time-fixed effect on the total number of restructured assets.

years jointly have a significant time-fixed effect on the explained variable or not. It is a joint test in which the null hypothesis states that dummies for all years are equal to 0, and if the null hypothesis is not rejected, then no time-fixed effects are required. The result of the Testparm test is given in Table 9.

Hence, it is proven by Table 9 that time-fixed effects jointly of all years on total restructured debts are present in the model. By using the time dummy of each year in the FEM, the time-fixed effect of each year individually is observed and given in Table 10.

It is also observed that the problems of heteroskedasticity and autocorrelation are present in the residuals of the model, which is an issue of concern and must be taken care of in the final panel regression model. Hence, robust standard errors will be used in the final model (the Fixed Effect Model).

The estimation of the final model, that is, the Fixed Effect Model, is given by equation (4) :

$$RESD_{it} = \alpha_{it} + \beta_{1it} GA_{it} + \beta_{2it} GNPA_{it} + \mu_i + v_{it} \quad \text{.....(4)}$$

where, the symbols depicted in equation (4) stand for :

$i = 1, 2 \ldots N$ (no. of banks),

$t = 1, 2 \ldots T$ (time periods),

i = index of sampled banks = 1 to N,

t = time-interval,

Y_{it} = dependent variable or explained variable,

X_{it} = regressor or independent variable or explanatory variable,

α_{it} = constant or intercept term for the sampled bank i in year t,

$\beta' = K^*1$,

K = Total no. of regressors,

β_{1it} = coefficient of gross advances for the sampled bank i in year t,

β_{2it} = coefficient of gross non-performing assets for the sampled bank i in year t,

$GNPA_{it}$ = gross non-performing assets for the sampled bank i in year t,

GA_{it} = gross advances for the sampled bank i in year t,

Table 10. ***The Outcome of the Fixed Effect Model with Robust Standard Error***

RESD	Coef.	Robust St.Err.	*t*-value	*p*-value	[95% Conf	Interval]	Sig
GA	0.046	0.002	23.22	0.000	0.042	0.050	***
GNPA	4951.671	1873.060	2.64	0.016	1044.537	8858.805	**
2008[b].Year	0.000	.	.	.	.	.	
2009.Year	14197.111	2765.045	5.13	0.000	8429.329	19964.893	***
2010.Year	22625.188	6029.195	3.75	0.001	10048.508	35201.867	***
2011.Year	–7483.293	5401.444	–1.39	0.181	–18800.000	3783.922	
2012.Year	13890.260	10175.223	1.37	0.187	–7334.884	35115.405	
2013.Year	73314.705	12561.686	5.84	0.000	47111.487	99517.924	***
2014.Year	79964.729	16183.906	4.94	0.000	46205.693	114000.000	***
2015.Year	109000.000	20766.892	5.23	0.000	65287.031	152000.000	***
2016.Year	43650.448	19871.666	2.20	0.040	2198.879	85102.017	**
2017.Year	–18800.000	24639.690	–0.76	0.456	–70100.000	32646.672	
2018.Year	–56000.000	33539.805	–1.67	0.111	–126000.000	14012.144	
Constant	–40100.000	7288.339	–5.50	0.000	–55300.000	–24900.000	***
Mean dependent var		101039.000	*SD* dependent var			118399.761	
R-squared		0.791	Number of observations			231.000	
F-test		570.877	Prob > *F*			0.000	
Akaike crit. (AIC)		5594.297	Bayesian crit. (BIC)			5635.606	

Note. *** $p<0.01$, ** $p<0.05$, * $p<0.1$; [b]. Year stands for base year.

$RESD_{it}$ = total restructured debts for the sampled bank i in year t,

μ_i = individual fixed effect or firm fixed effect or unobserved heterogeneity,

v_{it} = idiosyncratic errors or purely white noise error term.

Table 10 gives the result of the Fixed Effect Model with a time dummy for each year and robust standard errors. Robust standard errors are employed to take care of the heteroskedasticity and serial correlation issues present in the residuals of the model.

The interpretation of the estimated output is as follows :

$$RESD_{it} = -40100.000 + 0.046 * GA_{it} + 4951.671 * GNPA_{it} \quad \text{.....(5)}$$

It is observed that the intercept term or constant of the panel regression equation is – 40100.000 that at a 1% significance level is highly statistically significant. The coefficient of GA is 0.046, which is also highly statistically significant at a 1% significance level, and positively impacts the total number of restructured loans. This signifies that when the GA rises by 1 unit, the RESD also rises by 0.046 units, other factors remaining constant. Hence, alternative hypothesis 1 (Ha1) is accepted and proven at a 1% significance level, which supports that there is a statistically significant effect of gross advances on the total number of restructured debts. The coefficient of GNPA is 4951.671 that is also highly statistically significant at a 5% significance level, and impacts the total number of restructured loans positively. This signifies that when the GNPA rises by 1 unit, the

RESD increases by 4951.671 units, other factors remaining constant. Hence, alternative hypothesis 2 (Ha2) is accepted and proven at a 5% significance level, which supports that there is a statistically significant effect of gross NPAs on the total number of restructured debts. It is also observed that time-fixed effects jointly of all years on the total number of restructured debts are present in the model. This implies that all the years jointly have a significant time-fixed impact on the total number of restructured loans as the *p*-value is 0.00, which is highly statistically significant at a 5% significance level. Hence, the alternative hypothesis 3 (Ha3) in favor of the presence of time-fixed effects jointly of all years on the total number of restructured debts is accepted and proven at a 5% significance level. It is also observed that there is a significant time-fixed effect of each year individually on the total number of restructured debts. The highly statistically significant years at a 1% significance level are 2009, 2010, 2013, 2014, and 2015 and have a statistically significant time-fixed effect individually on the total number of restructured debts. It is also observed that 2016 is a highly statistically significant year at a 5% significance level and has a statistically significant time-fixed effect individually on the total number of restructured debts. The years 2011, 2012, 2017, and 2018 are statistically insignificant and do not have a statistically significant time-fixed effect individually on the total number of restructured debts. Hence, alternative hypothesis 4 (Ha4) is accepted and proven at the 5% and 1% significance levels, which states that there is a significant time-fixed effect of each year individually on the total number of restructured debts.

It is also found that the *p*-value of the *F*-test statistics is 0.00, which is highly statistically significant at the 5% significance level and confirms that all the coefficients in the model are statistically significant. It also confirms the overall significance of the final panel regression model that the model is quite good and acceptable. Hence, the alternative hypothesis 5 (Ha5) is accepted and proven at a 5% significance level, supporting that the final panel regression model is significant and acceptable. It is also found that *R*-squared within is 0.791, which implies that 79.1% of the variation in the explained variable RESD is described by the regressors GNPA and GA. The residuals describe the rest 20.9% of the change in the dependent variable RESD. Hence, the explanatory power of the two regressors to explain the change in the dependent variable is quite good. Thus, it is verified that the final model, the Fixed Effect Model, is quite good and acceptable.

Conclusion and Policy Recommendations

The main aims of this research are first to investigate the effect of gross NPAs and gross advances on the total number of restructured debts in the sampled banks, and secondly, to analyze the time-fixed effect of all the years jointly and each year individually on the total number of restructured debts in the sampled banks from 2008 – 2018. Panel data regression modeling has been used where the Fixed Effect Model (FEM) is employed to attain these objectives of the study. The findings conclude that gross advances at a 1% significance level are highly statistically significant and positively impact the total number of restructured loans. This association between gross advances and total restructured loans supports the economic theory, which states that when the gross advances increase, the chances of default of loans and eventually gross NPA level will also increase. Therefore, the banks will restructure stressed loans, and the total number of restructured loans will rise.

Similarly, gross non-performing assets are also highly statistically significant at a 5% significance level and positively impact the total number of restructured loans. This relationship between gross NPAs and total restructured loans supports the economic theory that when the gross NPAs increase, the restructuring of stressed loans by the banking authorities will also increase. It is also observed that the intercept or constant term is highly statistically significant at a 1% significance level. The outcome also confirms that all the years jointly and each year individually have a significant time-fixed effect on the total number of restructured debts. The years that are highly statistically significant at a 1% significance level are 2009, 2010, 2013, 2014, and 2015 ; whereas, 2016

is a highly statistically significant year at a 5% significance level. It is confirmed that the final panel regression model is significant and acceptable as well as the explanatory power of the explanatory variables to describe the change in the dependent variable is quite good.

Bank debt restructuring is the best mechanism to deal with financial stress in the hassled banking system. Hence, banking authorities must formulate such debt restructuring and banking policies which completely alleviate the financial distress from the banks. As this stressed environment in the banks is mainly because of the stressed loans or NPAs or credit policy paralysis ; hence, banks must review and revamp their credit policies regarding loan disbursal, especially in public sector banks, to minimize the gross NPAs.

Limitations of the Study and Scope for Further Research

The generalization of the study may be restricted to some extent due to the limited sample size. The sample consists of all 21 Indian public sector banks. Other categories of Indian banks are not considered that may restrain the generalization of the study to some extent. The period of this research is limited to 2008–2018. Due to its privacy, the availability of the required data was a slightly challenging task. This research is primarily based on secondary data that does not discuss the qualitative aspects of bank debt restructuring. Various econometric tools used in the study may lack precision. The econometric model may suffer from serial correlation and heteroskedasticity problems that may impact the precision of the estimates.

There is a wider scope for future studies in the field of bank debt restructuring. It is expected that future researchers will be accomplished on the cost of bank debt restructuring as strategic debt restructuring leads to a change in ownership and dividend distribution among the shareholders. Bank debt restructuring in other categories of Indian banks other than Indian public sector banks such as foreign banks, private sector banks, RRBs, etc., can also be studied in the future.

Authors' Contribution

Tabassum envisaged the concept and formulated the panel data regression modeling to carry out this empirical research. Tabassum extracted various research papers from highly reputed journals based on keywords. Dr. Sarveshwar Pande validated the econometric tools and supervised the research. The statistical calculations were done by Tabassum using STATA 14.0 version, EVIEWS 9.0 version, and M.S. Excel. Tabassum wrote the manuscript in consultation with the co-author, Dr. Sarveshwar Pande.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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References

Ahamed, M. M., & Mallick, S. K. (2017). House of restructured assets : How do they affect bank risk in an emerging market? *Journal of International Financial Markets, Institutions and Money, 47,* 1–14. https://doi.org/10.1016/j.intfin.2016.11.012

Baltagi, H. B. (2005). *Econometric analysis of panel data* (3rd ed.). John Wiley and Sons.

Brooks, S. (2020). What finance wants : Explaining change in private regulatory preferences toward sovereign debt restructuring. *Review of International Political Economy,* 1–24. https://doi.org/10.1080/09692290.2020.1788114

Cheng, G., Diaz-Cassou, J., & Erce, A. (2018). Official debt restructurings and development. *World Development, 111,* 181–195. https://doi.org/10.1016/j.worlddev.2018.07.003

Demiroglu, C., & James, C. (2015). Bank loans and troubled debt restructurings. *Journal of Financial Economics, 118*(1), 192 – 210. https://doi.org/10.1016/j.jfineco.2015.01.005

Greenwood, R., Iverson, B., & Thesmar, D. (2020). *Sizing up corporate restructuring in the COVID crisis* (Working Paper No. 28104). National Bureau of Economic Research. http://www.nber.org/papers/w28104

Hoshi, T., Koibuchi, S., & Schaede, U. (2018). The decline in bank-led corporate restructuring in Japan: 1981 – 2010. *Journal of the Japanese and International Economies, 47,* 81–90. https://doi.org/10.1016/j.jjie.2017.11.004

Huang, J. - C., & Huang, C. - S. (2011). The effects of bank relationships on firm private debt restructuring: Evidence from an emerging market. *Research in International Business and Finance, 25*(1), 113–125. https://doi.org/10.1016/j.ribaf.2010.09.001

Inoue, K., Kato, H. K., & Bremer, M. (2008). Corporate restructuring in Japan: Who monitors the monitor ? *Journal of Banking & Finance, 32*(12), 2628 – 2635. https://doi.org/10.1016/j.jbankfin.2008.05.014

Iwanicz-Drozdowska, M., Smaga, P., & Witkowski, B. (2016). Bank restructuring in the EU: Which way to go? *Journal of Policy Modeling, 38*(3), 572 – 586. https://doi.org/10.1016/j.jpolmod.2016.03.001

Jiang, J., Liu, B., & Yang, J. (2019). The impact of debt restructuring on firm investment: Evidence from China. *Economic Modelling, 81,* 325 – 337. https://doi.org/10.1016/j.econmod.2019.05.019

Joshi, N. A., & Desai, J. (2019). Financial restructuring and its impact on operating performance in the energy sector in India. *Indian Journal of Finance, 13*(1), 37 – 54. http://doi.org/10.17010/ijf/2019/v13i1/141047

Kim, W., Ko, Y. K., & Wang, S. - F. (2019). Debt restructuring through equity issues. *Journal of Banking & Finance, 106,* 341–356. https://doi.org/10.1016/j.jbankfin.2019.07.002

Li, S., Liu, C., Zheng, M., Chang, C. - P., & Fu, Q. (2020). Financial market friction and corporate restructuring activities in China. *Emerging Markets Finance and Trade,* 1–16. https://doi.org/10.1080/1540496X.2020.1801409

Mamatzakis, E., Matousek, R., & Vu, A. N. (2016). What is the impact of bankrupt and restructured loans on Japanese bank efficiency? *Journal of Banking & Finance, 72,* S187–S202. https://doi.org/10.1016/j.jbankfin.2015.04.010

Micucci, G., & Rossi, P. (2017). Debt restructuring and the role of banks' organizational structure and lending technologies. *Journal of Financial Services Research, 51*(3), 339–361. https://doi.org/10.1007/s10693-016-0250-5

Miles, J. (2014). Tolerance and variance inflation factor. *Wiley StatsRef: Statistics Reference Online.* https://doi.org/10.1002/9781118445112.stat06593

Mo, X., & Jiang, J. (2020). Political connections, debt restructuring, and enterprise investment: Evidence from China. *Discrete Dynamics in Nature and Society 2020,* 1–13. https://doi.org/10.1155/2020/5041768

O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity, 41*(5), 673 – 690. https://doi.org/10.1007/s11135-006-9018-6

Otašević, D. (2015). The influence of macroeconomic risks on credit risk in the Serbian banks' loan portfolio. *Neo-Transitional Economics (International Finance Review), 16,* 219–243. https://doi.org/10.1108/S1569-376720150000016010

Pawlina, G. (2010). Underinvestment, capital structure and strategic debt restructuring. *Journal of Corporate Finance, 16*(5), 679 – 702. https://doi.org/10.1016/j.jcorpfin.2010.06.010

Payne, J. (2018). Debt restructuring in the UK. *European Company and Financial Law Review, 15*(3), 449 – 471. https://doi.org/10.1515/ecfr-2018-0014

Piroska, D., & Podvrsic, A. (2020). New European banking governance and crisis of democracy : Bank restructuring and privatization in Slovenia. *New Political Economy, 25*(6), 992–1006. https://doi.org/10.1080/13563467.2019.1669548

Reserve Bank of India. (2015). *Master circular - Prudential norms on income recognition, asset classification and provisioning pertaining to advances.* https://rbidocs.rbi.org.in/rdocs/notification/PDFs/101MC16B68A0EDCA9434CBC239741F5267329.PDF

Reserve Bank of India. (2018). *Resolution of stressed assets - Revised framework.* https://rbidocs.rbi.org.in/rdocs/notification/PDFs/131DBRCEC9D8FEED1C467C9FC15C74D01745A7.PDF

Reserve Bank of India. (2019). *Handbook of statistics on Indian economy.* https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/0HB201819A91A298806164470A2BCEF300A4FE334.PDF

Reserve Bank of India. (2020). *Database of Indian economy: Loans subjected to restructuring and corporate debt restructured.* https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications

Rybak, O. M., & Puskov, D. O. (2020). Restructuring of problem loans of banks in times of crisis. *Innovative Economy,* 3–4, 65–70. https://doi.org/10.37332/2309-1533.2020.3-4.9

Shi, X. (2010). Restructuring in China's state - owned enterprises: Evidence from the coal industry. *China & World Economy, 18*(3), 90 – 105. https://doi.org/10.1111/j.1749-124X.2010.01198.x

Tumenbayeva, O. (2012). Kazakhstan banking system restructuring (2007 – 2010). *Procedia-Social and Behavioral Sciences, 62,* 1107–1109. https://doi.org/10.1016/j.sbspro.2012.09.189

Wajid, A., Singh, H., & Ansari, A. (2019). Corporate restructuring through mergers: A case of ICICI Bank. *Indian Journal of Finance, 13*(8), 38–50. http://doi.org/10.17010/ijf/2019/v13i8/146303

Wooldridge, M. J. (2001). *Econometric Analysis of Cross Section and Panel Data* (1st ed.). MIT Press.

About the Authors

Tabassum is a PhD Scholar at the Amity Business School in Amity University Uttar Pradesh, Lucknow Campus (India). Her current areas of interest are banking and finance, economics, and insurance. She has work experience of 2+ years in the banking and insurance industry. She is the author of various publications presented in national and international conference proceedings and journals.

Dr. Sarveshwar Pande is an Assistant Professor at the Amity Business School in Amity University Uttar Pradesh, Lucknow Campus (India). His current areas of interest are accounting, finance, and auditing. He is the author of various publications in reputed national and international journals.