

CHAPTER-5

METHODOLOGY

A. Methodology based on the performance of some selected Indian commercial bank during (FY 2000-01 to 2014-15):

5.1. Collection of data:

The present study on the performance of the selected banks is primarily based on data collected from secondary market. The secondary data have been collected primarily from the Department of Research and Statistics of Indian Banking Association (IBA). The member of such Association (IBA) are selected from public & private sector banks, foreign banks, co-operative and regional rural banks and all India financial institutions etc. whose objects is to support and develop banking principles, practices and provide various common service to the member and to the Banking industry. Besides, the secondary data have been arranged from Reserve Bank of India (RBI), Annual Report of public and private sector banks, banking journal and magazine in India, Reports of Committees set up by the Government, websites of various governments and non-government agencies etc. The banks' Annual Reports to assess the effect of M&A on the performance of said banks. Moreover, banking journals (such as Banking Frontiers), research work published in seminar lectures etc. have been carefully followed to analyze our results. The secondary data, which has been collected, was subjected to elaborative and inferential study.

5.2. Period of Study:

For comparison of performance of the Nedungadi Bank Limited (NBL) vs. Punjab National Bank (PNB), data for years before the merger and data for years after the merger have been examined. Thus, a period of study for 15 years (2000-2001 to 2014-15) has been analyzed. Since the date of merger was taken place on February 1, 2003, two years' pre-merger period has been considered due to paucity of data of Nedungadi Bank Ltd (from the period FY 2000-2002) because of difficulty in retrieving annual report of Nedungadi Bank for earlier periods.

The M&As of Global Trust Bank (GTB) Ltd. with Oriental Bank of Commerce (OBC), data for four years period before merger dated on August 14, 2004 (i.e. FY 2000-01 to 2003-4) and data for years after the merger (up to FY 2014-15) have been examined. Thus, a period of study for 15 years (2000-2001 to 2014-15) has been examined.

The M&As of United Western Bank (UWB) Ltd. with IDBI Ltd.: IDBI, constituted as a development financial institution under Industrial Development Bank of India Act, 1964, was registered as a govt. company on September 27, 2004. In order to attaining rapid growth of the bank, IDBI Bank Ltd, a wholly owned subsidiary of IDBI Ltd, was merged with IDBI LTD in 2005. Therefore, data in statistical book or annual report of the bank available from 2004-05 compels us to initiate the analysis of merger from 2004-05. The marriage of United Western Bank with IDBI Ltd. had taken place in the year 2006-07 (the date of merger October 3, 2006). The data for two years before merger (i.e. FY 2004-05 & 2005-06) and data for years after the merger have been examined for IDBI

bank. Thus, period of study for 10 years (2004-2005 to 2014-15) has been considered for M&As of UWB with IDBI.

For M&As of Centurion Bank of Punjab (CBoP) with HDFC Bank: On October 1, 2005, the name of Centurion Bank Ltd. was changed to Centurion Bank of Punjab Ltd. after consolidation with Bank of Punjab Limited. Again, the consolidation of Centurion Bank of Punjab with HDFC Bank was taken place on May 23, 2008. The data for years before the merger and data for years after merger have been studied for a period from FY 2005-06 to 2014-15. Thus, period of study for 10 years (2005-2006 to 2014-15) has been examined.

Lastly, for M&As of the Bank of Rajasthan (BOR) with ICICI Bank Ltd.: The data for years before merger and data for years after merger have been studied. Thus, period of study for 15 years (2000-01 to 2014-15) has been analyzed.

In brief, it can be inferred that 5 pairs of merger banks have been selected in such a fashion that these analyses of merger covers the entire study period 2000-01 to 2014-15.

5.3. Sample banks undertaken:

We have undertaken 5 cases of M&As where three weak private sectors banks-namely Nedungadi Bank Ltd., Global Trust Bank Ltd. and UWB (United Western Bank) Ltd have been merged with three public sector banks namely- Punjab National Bank, OBC (Oriental Bank of Commerce) and IDBI Ltd. respectively. On contrary, two (2) weak private sector banks namely- Centurion Bank of Punjab Ltd., The Bank of Rajasthan have been merged with another two (2) large private sector banks- HDFC Bank Ltd and ICICI Bank Ltd respectively. We have selected such combination of public –private merger and private –private mergers of banks under our study to make a meaningful comparison of

the effect of merger of several types of banks. The following (table no. 5.1) shows the details of merger of our selected banks undertaken for our study.

Table no. 5.1: Sample banks Merger and Acquisition (M&A) during FY 2000-01 to 2014-2015			
S.No.	Target Bank	Acquirer Bank	Date of Merger
1	Nedungadi Bank Ltd.	Punjab National Bank	1-Feb-03
2	Global Trust Bank Ltd.	Oriental Bank of Commerce	14-Aug-04
3	United Western Bank Ltd.	IDBI Ltd	3-Oct-06
4	Centurion Bank of Punjab Ltd.	HDFC Bank Ltd	23-May-08
5	The Bank of Rajasthan	ICICI Bank Ltd	13-Aug-10
Source: Author's own estimate			

5.4. Method of analysis:

For reaching the results vis-à-vis to study the effect of merger on acquiring (merged) banks, before and after merger economic performance have been linked in terms of several suitable financial ratios. The pre-and post-merger economic performance have been attained in terms of Credit-Deposit ratio, Investment-Deposit Ratio, Priority sector advance as % to total advance, Deposit per employee, Advance per employee, Interest income as a % of total income, Non-interest income as a % of total income, Interest expenses as a % of total expenses, Establishment expenses as a % of total expenses, Other operating expenses as a % of total expenses, Spread as a % to Assets, Interest Income as % to average working funds, Non-interest Income as % to average working funds, Operating profit as % to average working funds, Return on Asset (ROA), Net NPA as % to net advances, Capital Adequacy Ratio [CAR(%)] etc.

The pre-merger (two years/three years/four years before) and post-merger (two years/three years/four years) financial ratios have been compared for paired t-test depending upon the availability of database. The year of merger is considered as base year and denoted as '0', which has been omitted from the analysis. Considering the objective of the study, we have taken into consideration the mean difference, standard deviation, independent pair t-test as tools of statistical evaluation of our study. In relation to test the null hypothesis, paired t- test is used. This test is a parametric statistical hypothesis for the case of two related samples on a single sample.

This study has also tried to check the hypotheses linking to the effect of M&As on the various performance parameters and thus derive a conclusion about whether the event of M&A has made a positive impact on performance of these banks or not. The software SPSS, E.Views and MS Excel are applied to compute and examine the data. The ratios of each performance indicators are estimated for the above-mentioned merger individually. Thereafter, we have compared average or means of each performance indicators over time i.e. pre and post-merger period.

5.5. Financial ratios used for our study:

- (i) Credit -Deposit Ratio= $\frac{\text{Total Advance}}{\text{Total Deposit}} \times 100$
- (ii) Investment- Deposit Ratio: $\frac{\text{Total Investment}}{\text{Total Deposit}} \times 100$
- (iii) Priority sector advance as % to total advance: $\frac{\text{Priority sector advance}}{\text{Total advance}} \times 100$
- (iv) Deposit per employee: $\frac{\text{Total Deposit}}{\text{No of employees}}$
- (v) Advance per employee: $\frac{\text{Total Advance}}{\text{No of employee}}$
- (vi) Interest income as a % of total income: $\frac{\text{Interest earned}}{\text{Total income}} \times 100$
- (vii) Non-interest income as a % of total income: $\frac{\text{Non-interest earned}}{\text{Total income}} \times 100$

- (viii) Interest expenses as a % of total expenses = $\frac{\text{Total interest expended}}{\text{Total expenditure}} \times 100$
- (ix) Establishment expenses as a % of total expenses (TE) = $\frac{\text{Establishment expense}}{\text{TE}} \times 100$
- (x) Other operating expenses as a % of total expenses (TE) = $\frac{\text{Other operating expenses}}{\text{TE}} \times 100$
- (xi) Spread as a % of total assets = $\frac{\text{Spread (interest income minus expenses)}}{\text{Total assets}} \times 100$
- (xii) Interest income as % to average working funds (AWF) = $\frac{\text{Interest earned}}{\text{AWF}} \times 100$
- (xiii) Non-interest income as % to average working funds (AWF) = $\frac{\text{Non-interest earned}}{\text{AWF}} \times 100$
- (xiv) Operating profit as % to average working funds (AWF) = $\frac{\text{Operating profit}}{\text{AWF}} \times 100$
- (xv) Return on Asset (ROA) = $\frac{\text{Net profit}}{\text{Average assets}} \times 100$
- (xvi) Net NPA as % to net advances = $\frac{\text{Net NPA}}{\text{Net advances}} \times 100$
- (xvii) CAR (%) = Tier-I Capital (%) + Tier-II Capital (%)

5.6. Description of variables used:

(i) Credit-Deposit (CDR) Ratio (Total advances/Total deposit X 100):

RBI (Reserve Bank of India) does not prescribe any minimum or maximum level of CDR ratio for banks. Higher the CDR ratio, higher is the utilization of depositor's money, which help banks to earn higher return on their assets. A high CDR indicates two things, firstly, the bank is lending out majority of its deposits in the form of interest carrying loans and advances; secondly, the bank makes more income on lending its deposits. Because of the various factors, in various circumstances, banks are unable to recover the lending fund along with interest from the borrower. Here the main concerned is failure of settlement of credit and advances, in such circumstance, the banks are liable to repay (return back) the deposited money to their customers, therefore, too high ratio place the bank at high jeopardy. Alternatively, a very low ratio means bank is not consuming its assets to make income. CDR is a barometer to ascertain progress of commercial banks.

(ii) Investment- Deposit Ratio (Total investment / Total deposit X 100):

The total of all the long term and short term investment made by the bank on other sources like banks, investment in Govt. securities & stock market, loans and advances divided by total amount of deposits raised by the bank by various account like current & savings account (CASA), Recurring deposit account and Fixed account etc. Besides, cash reserve ratio (CRR) as prescribed by RBI, Banks have to finance certain % of its deposits in identified financial instruments (such as Central Govt. or State Govt. securities or bonds).

(iii) Priority sector advance as % to total advance (Priority sector advance/Total Advance X 100):

As per the circular issued by Reserve Bank of India (RBI), the priority sector lending (PSL) has been classified in broad 8 categories. The public and private sector banks can now focus on to achieve their target. The Priority Sector Lending are:

- (1) Agriculture
- (2) Micro, Small and Medium Enterprises
- (3) Export Credit
- (4) Education
- (5) Housing
- (6) Social Infrastructure
- (7) Renewable Energy and
- (8) Others.

The intension behind the PSL (priority sector lending) programme is to make sure that adequate credit flows into above sectors (called vulnerable sectors of the economy),

which may not be profitable business for the banks but would have long term implication on the socio-economic development of the country.

(iv) Deposit per employee (DPE): (Total Deposit /No of employees):

This tool measures the efficiency of all employees of a bank for accepting low cost public deposits from the customer and depositors. It is calculated by dividing the total deposits by total number of personnel (employees) in a year. Upward DPE indicates the employees' efficiency of the banks.

(v) Advance per employee (APE): (Total Advance /No of employee):

This tool also measures the efficiency of all the employees for creating business (lending credit to borrower) for the bank. It is obtained by dividing total Advances by total employees. Upward DPE indicates the effectiveness of employees' serving the banks.

(vi) Interest income as a % of total income (Interest earned/Total income X 100):

Interest income (earning) is a primary conduit for revenue of banks. The interest income to total income shows its ability for creating income from its credit operations, which is the primary income segment of banks. This ratio assess the ability of generating income from credit operations, which is expressed as % of gross income created by the bank with in year. Interest income includes interest on loan and advances given, interest on compulsory deposits with RBI and dividend income.

(vii) Non-Interest Income to total income (NIITI) (Non-interest earned/Total income X100):

Non-interest income refers to the income of a bank generating from its allied and other business activities (other than interest income). Non –interest income primarily include fees based income such as transaction fees, annual fees, monthly service charges, charges

from failing to keeping minimum quarterly balance (AQB), income related to credit card (late fees, penalty etc.). Banks are always trying to increase their non-interest income to enhance their return on assets. This determines the operational income except lending, which is expressed as % of the gross income. The bank creates superior level non-interest income by pioneering products, which is innovative in nature and following technology for continued operational levels. Non-interest income denotes the income earned by the banks excluding income on loan & advances and deposits with Reserve bank of India.

(viii) Interest expenses as a % of total expenses (Total interest expended/Total expenditure):

This tool measures the operational efficiency of bank. The object of this ratio is to minimize cost of accepting loan and advances or liabilities of banks. Interest expenses generally include interest paid on borrowing fund, savings account deposit or liabilities. It also include expenses on borrowing of fund, savings account deposit and liabilities and may include difference between issue price on debt instruments and their par value.

(ix) Establishment expenses as a % of total expenses = Establishment expense/Total expenditure:

This tool measures the operational efficiency of bank. The more is the ratio, the lesser is the profitability. Establishment expenses of bank are a function of two factors: (a) number of employees (b) scale of their emolument. With the increase in number of employees of bank, this ratio obviously increases.

(x) Other operating expense (OOETE) Ratio (Operating Expenses/Total expenses):

The ratio has adverse relationship with profitability, and a high OE (operating expense) ratio highlights operational inefficiency of a bank.

(xi) Spread as % of total assets (STA) (Spread/Total Assets):

The meaning of spread is the difference between interest incomes minus interest paid in a year. The is computed as a percentage spread to total assets. The more the ratio will be, more will be the profitability and vice-versa. It is an important measure of a bank's core income (income from lending operations). A higher spread indicates the better earnings given the total assets. Interest income includes interest on lending operations, interest on deposit with RBI and dividend income etc. Whereas the interest expended included interest paid on deposits with bank, loan and borrowing from the RBI, and other short-term and long-term borrowing and loans.

(xii) Interest Income as % to average working funds: (Interest earned /Average working fund (AWF)

Interest earning is a primary conduit for revenue of banks. Interest income are the lending deposit-taking money with higher interest rate than the interest pays on deposits. Average Working Funds (AWF) is more important and useful concept in banking business rather than only working fund of last day of balance in ratio analysis. The reasons are that interest income are the result of whole years operations, which should be compared the completely period average and not with last day position. AWF is every day average of total assets divided by total liabilities applied by a bank during a year. This ratio indicates the well deployment of funds, which would the outcomes of greater operating profit. Thus, the ratio shows how a bank deploys its funds in earning interest income. It measures the economic performance of bank and uses the average working fund as a common indicator to analyses the various aspect of the bank.

**(xiii) Non-interest income as % to average working funds=Non-interest earned/
Average working fund (AWF)**

Non-interest income is generated from fees and other charges other than interest income. . The bank charges to account holder for providing number of services in addition to lending operations. Besides, the bank is also earning from underwriting, M&As related activities, advisory & insurance services and host of other services. Non-interest means the non-traditional income. Banks are getting more efforts to create more non-interest revenue (income) because of the various challenges such as high rate of interest, slowdown of economy, NPA issue etc. Therefore, the ratio shows how a bank deploys its funds in earning non- interest income. Thus, it measures the ability of bank for efficient use of working fund for operating and non-operating income as % of average working fund.

(xiv) Operating profit as % to average working funds (Operating profit/Average working fund (OPAWF):

Operating profit of bank is computed after deducting operating expenses from net interest income (interest income minus interest expenses). The object of calculating this ratio is to judge capability of the bank to generate income from its operation for every rupee expended on working funds. AWF (Average Working Funds) is more important and useful concept in banking business rather than only working fund of last day of balance in ratio analysis. The reasons are that operating profit are the result of whole years operations, which should be compared the completely period of average and not with last day position. AWF is daily average of total assets divided by total liabilities deployed

during a year. The efficient use of fund will create greater operating profit. Therefore, it indicates how a bank used its working funds in making profit.

(xv) Return on assets (ROA) (Net Profit or Loss/ Total assets x100):

ROA is a performance indicator of bank. This ratio shows the profitability of bank. This is derived by dividing its net profit to its assets. It indicates the profitable of bank compare to its assets. ROA is used for comparing other bank performance as well as management efficiency, how they use every rupee of asset for earning net profit of a bank. ROA gives an idea to the shareholder of bank how the bank is maximizing profit by using their money into profit. Total assets is the aggregating its total liabilities and shareholders' fund or total assets of a bank.

(xvi) Net Non-Performing Asset as % to net advance (NNPANA) (NNPA/Net Total assetsX100):

It measures the overall assets quality of bank. Banks with lesser NPAs effectively have more funds to advances, which in turn have more profitability of the bank. The ratio stands a reverse relationship with profitability as it indicates the credit risk of a bank. High NPA increases pressure on CAR (Capital Adequacy Ratio). Net NPAs of banks are derived by deducting provisions and interest suspense account from its Gross NPAs. Hence, Net NPAs are expressed as % of net advances. NPA depends upon the sub-standard assets, doubtful assets and loss assets of a bank.

(xvii) Capital Adequacy Ratio (CAR) (Capital/Risk weighted assets):

CAR is the capacity of banks by discharging its liability in time, responding its risk management strategy, absorb losses and avoid the risk of liquidation. Here, the risk may be the various kind of risk such as the credit risk, liquidity risk, regulatory risk, operational risk, compliance risk and market risk. This ratio protects the interest of the

depositors, investors and other stakeholders or lenders. CAR is used as instruments for indicating the financial health of Banks and preventing them the risk of Insolvency and Bankruptcy Code (IBC). It tells about the story of the financial condition of banks and indicate the capacity of management to generate additional resources to mitigate unpredicted losses. CAR is measured capital (Tier I capital plus Tier II capital) over risk-weighted assets instead of debt to equity. It shows the bank advantage. RBI implements the concept of CAR. As per the RBI requirements, all banks have to maintain at least specific level (or %) of capital adequacy ratio (CAR) from time to time. Although the minimum level of CAR is, vary from country to country of the world. Symbolically, $CAR = \frac{\text{Tier-I} + \text{Tier-II} + \text{Tier-III capital}}{\text{Risk Weighted Assets (RWA)}}$.

Tier –I capital is called owned capital or net worth fund or core capital of a bank. It is aggregating of equity capital and free reserves. Tier I capital is called permanent capital, which helps the banks to continue their operations, absorbing losses, if the situation arises. Tier II capital is bank’s supplementary capital. It includes sub-ordinate debt, hybrid financials products (convertible bonds having both debt and equity qualities), revaluation & undisclosed reserves, cumulative perpetual preference shares and other items etc. It is not the primary funding sources of banks like Tier I capital. The calculation of Tier II capital is more difficult to measure accurate and liquidate.

The risk weighted assets (RWA) means the minimum how much capital is needed by bank to cover up the risk associated with the assets. The risk assessment of each type of bank is depend upon the risk associated with them For example: the risk associated with liquid cash & bank deposit and government bond is zero, the debenture and loan are associated with higher risk. The zero risk assets are subtracted from the total assets for

computation of capital adequacy ratio (CAR). Tier-III capital comprises of short-term subordinate debt.

We conclude that Capital Adequacy Ratio (CAR) makes stronger the national financial system in term of stability of banks as per the direction of the Regulators. The high CAR means stronger financial sectors, minimum chances of default of financial obligations either in short-term and long-term, safety and security of depositor and lenders money, protection to minority stakeholders and creating vibrant national financial market.

5.7. Hypotheses for testing the significant difference between Pre and Post-merger financial indicators:

The present work is essentially based on data from secondary sources; hence, hypothesis is being tested by using published materials. For analysis of testing the significant difference, we use Null Hypothesis and Alternative Hypothesis in our study. Null Hypothesis shows no variance in mean value of selected parameters before merger and after merger and Alternate Hypothesis shows the noteworthy variance in mean value of selected variables before merger and after merger.

Hypotheses have been formulated for testing the noteworthy variance between Pre- and Post-merger financial indicators, which have been depicted below:

H₀ (Null Hypothesis): There is no noteworthy variance between the pre-and post-merger financial indicators like Credit-Deposit Ratio, Investment-Deposit Ratio, Priority sector advance as % to total advance, Deposit per employee, Advance per employee, Interest income as a % of total income, Non-interest income as a % of total income, Interest expenses as a % of total expenses, Establishment expenses as a % of total

expenses, Other operating expenses as a % of total expenses, Spread as a % to Assets, Interest Income as % to average working funds (AWF), Non-interest Income as % to average working funds(AWF), Operating profit as % to average working funds(AWF), Return on Asset (ROA), Net NPA as % to net advances, Capital Adequacy Ratio [CAR(%)] etc.

Alternatively,

Let Mean value before merger be X_1 , Mean value after merger be X_2 .

$H_0: X_1 = X_2$ Null Hypothesis: There is no variance in mean value of selected variables before merger and after merger.

H_1 (Alternative Hypothesis): There is noteworthy variance between the pre-and post-merger financial indicators like Credit-Deposit, Ratio, Investment- Deposit Ratio, Priority sector advance as % to total advance, Deposit per employee, Advance per employee, Interest income as a % of total income, Non-interest income as a % of total income, Interest expenses as a % of total expenses, Establishment expenses as a % of total expenses, Other operating expenses as a % of total expenses, Spread as a % to Assets, Interest Income as % to average working funds (AWF), Non-interest Income as % to average working funds (AWF), Operating profit as % to average working funds(AWF), Return on Asset(ROA), Net NPA as % to net advances, Capital Adequacy Ratio [CAR(%)] etc.

Alternatively,

$H_1: X_2 \neq X_1$ Alternate Hypothesis: There is variance in mean value of selected variables pre and post-merger of banks.

After the ratios for each of the performance parameters were estimated for the above-mentioned mergers individually, this was followed by the Shapiro-Wilk normality test. Based on the normality results, paired t test at 95% confidence level was carried out for parameters following normal distribution and Wilcoxon Paired Sign-Rank test was conducted for factors not following normal distribution. We have also conducted Kolmogorov-Smirnov test to justify whether there is violation in normality assumption.

Thereafter, we compare means of the performance parameter over time i.e. pre and post-merger. T-test and Wilcoxon test were chosen because those are popularly used for computing pre-post analysis of a phenomenon. The Shapiro–Wilk test is conducted to test normality. The different parameters chosen for study were ROA (Return of Assets), CDR (Credit-Deposit Ratio), IDR (Investment Deposit Ratio), PSA (Priority Sector Advance), DPE (Deposit Per Employee), APE (Advance Per Employee), IITI (Interest Income as % of Total Income), NIITI (Non-Interest Income as % of Total Income), IETE (Interest Expense as a % Total Expense), EETE (Establishment Expenses as % of Total Expenses), OOETE (Other Operating Expenses as a % of Total Expenses), STA (Spread as % of Total Assets), IIAWF (Interest Income as % to Average Working Fund), NIIAWF (Non-Interest Income as % to Average Working Fund), OPAWF (Operating Profit as % to Average Working Funds), NNPA (Net NPA as % to Net Advances) and CAR (Capital Adequacy Ratio).

5.8. Kolmogorov-Smirnov test:

This test judges whether there is noteworthy departure from normality in the population distribution for each of the banks. The null hypothesis states that the normality assumption is not violated.

This test is used as a test of goodness of fit and it is ideal, if the sample size is small. The null hypothesis assumes no difference between the observed and theoretical distribution and the value of test statistic 'D' is calculated as:

Formula

$$D = \text{Maximum } |F_o(X) - F_r(X)|$$

Where –

- $F_o(X)$ = Observed cumulative frequency distribution of a random sample of n observations
- $F_o(X) = k/n = (\text{No. of observations} \leq X) / (\text{Total no. of observations})$.
- $F_r(X)$ = the theoretical frequency distribution.

The critical value of D is found from the K-S table values for one sample test.

Acceptance Criteria: If calculated value is less than critical value.

Rejection Criteria: If calculated value is greater than table value.

5.9 Shapiro–Wilk (S-W) test:

The Shapiro–Wilk test is a test of normality in frequentist statistics. The null-hypothesis of this test is that the population is normally distributed.

The S-W test tests the null hypothesis that a sample x_1, \dots, x_n came from a normally distributed population. The test statistic (W) is:

$$W = \frac{(\sum_{i=1}^n a_i x_{(i)})^2}{(\sum_{i=1}^n (x - \bar{x})^2)}$$

Where $x_{(i)}$ = the ordered sample values;

a_i = constants generated from the mean, variance and co-variances of the order statistics of a sample size n from a normal distribution.

5.10 Paired sample 't' test:

It confirms whether there is any noteworthy variation in difference of mean of the parameters undertaken into our study pre and post-merger announcement of (M&As) event of bank. The hypotheses for test are identified below (Bhaumik and Selarka, 2008).

H₀: There is no noteworthy variance of mean of the parameters due to the before and after merger (M&As) of bank. The object of this test is to reveal the hypothesis (null hypothesis or alternative hypothesis) with which the data are more consistent and to evaluate the degree of deviation in order to decide the quality of results. It is reveal the difference in mean value in pre and post-merger period, not the original data value.

H₁: There is a noteworthy variance in mean difference due to the before and after merger (M&As) of bank.

The hypotheses can be articulated in two diverse ways that definite the same above idea and are mathematically equivalent:

$H_0: \mu_1 = \mu_2$ ("the paired population means are equal")

$H_1: \mu_1 \neq \mu_2$ ("the paired population means are not equal") or

$H_0: \mu_1 - \mu_2 = 0$ ("the difference between the paired population means is equal to 0")

$H_1: \mu_1 - \mu_2 \neq 0$ ("the difference between the paired population means is not equal to 0")

Where μ_1 is the population mean of variable 1, and μ_2 is the population mean of variable 2.

5.11 Wilcoxon signed-ranks test:

The Wilcoxon Signed-Rank test is a non-parametric statistical hypothesis test. It aims to reveal the differences of mean value before and after merger period of banks in the following manner:

- (a) Difference of mean is calculated for before and after merger period;
- (b) Differences are ranked;
- (c) Ranks are assigned with plus (+) and minus (-) sign of the corresponding differences;
- (d) Computation of sum of positive signed ranks and sum of the negative signed ranks;
- (e) In the calculation, the difference of zero are ignored in order to confirm that the total should be: $T(\text{plus}) + T(\text{minus}) = n(n+1)/2$

It is to be applied as a substitute to the paired Student's t -test, t -test for matched pairs, or the t -test for dependent samples when the population cannot be assumed to be normally distributed. Therefore, it is the non-parametric version of a paired

samples t-test. It is appropriated when the variance between two variables is abnormally distributed. If the P value is less than or equal to 0.05, reject the null hypothesis, where the P value is derived from the normal distribution and accept the alternative hypothesis or vice-versa.

We can calculate the test statistic W:

$W = \sum_{i=1}^{N_r} [\text{sgn}(x_{2,i} - x_{1,i}) \cdot R_i]$, the sum of the signed ranks. This distribution has an

expected value of 0 and a variance of: $\frac{N_r(N_r + 1)(2N_r + 1)}{6}$

5.12 Regression analysis:

Regression analysis aids us to know the connection between the predictor variables with dependent variable. Independent variables is called ‘predictors’ and dependent variable is called ‘outcome variables’. Backward multiple regression study was inferred to suggest the effect of determinants on the ROA of selected banks. Therefore, multiple regressions will be conducted through SPSS package using OLS (Ordinary Least Square) Estimation Method to test the set of hypotheses or more clearly to test how the independent variables influence the Return on Assets (ROA). Checking the multicollinearity issue is an essential part for using the regression analysis. Simply multicollinearity problem can be estimated by using the pair wise correlation matrix. First, the pair-wise correlations among the independent variables were examined. The strong connection among the predictor variables (problem of multicollinearity) was prevailed because of existence of correlation of about 0.90 or larger indicates.

When independent variables are strongly correlated in a multiple regression analysis, it is tough to identify the unique contribution of each variable in predicting the dependent

variable because the highly correlated variables are predicting the same variance in the dependent variable. There are different school of thoughts about the multicollinearity. One school of thoughts say correlations among two or more predictor variables above 0.70 indicate multicollinearity and other school of thoughts say that correlations among two or more predictor variables above 0.90 indicate multicollinearity. Multicollinearity is assessed by tolerance and the Variance Inflation Factor (VIF). Tolerance is assessed by $1-R^2$ where R^2 is the regression. It is always desirable for higher levels of tolerance because low tolerance value along with large standard errors and no significance may affect unfavorably the outcome connected with a multiple regression analysis. A small tolerance value shows that the independent variable in the equation is almost a perfect linear combination and that it should not be added to the regression equation. The VIF (Variance Inflation Factor) is used as indicator of multicollinearity in a regression model. The Variance Inflation Factor (VIF) is the reciprocal of tolerance such as: $1/\text{Tolerance}$ or $1/(1-R^2)$, it is always greater than or equal to 1. There is no formal VIF value for determining presence of multicollinearity. As a general rule of thumb is that multicollinearity exists when Tolerance is below 0.1 and values of VIF that exceed 10. A value of 1 indicate the no multicollinearity among the predictors' variables; value of 4-5, indicate the moderate to high multicollinearity among the predictors' variables; value more than 10 indicate the very high multicollinearity among the predictors' variables. When those R^2 and VIF values are high among the predictors' variables in regression model, multicollinearity is probably an issue.

In our study, we frame a regression equation by Ordinary Least Square method to evaluate the influence of various predictors on the RoA of the acquiring banks in our

study namely Punjab national bank, Oriental bank of commerce, IDBI bank, HDFC bank and ICICI bank as under. We have taken following six independent variables, which are free from multicollinearity, into our regression analysis based in Backward Elimination (BE) technique has been adopted to identify the principal predictors (independent variables) which are lying behind affecting dependent variable (ROA) in our estimate. Backward elimination (BE) technique, which is one of the technique of all variable selection procedures, can be used without software package. In this method, one by one, we have to eliminate weak independent variables from the regression equation model considered for our study unless and until all other existing variables add, to some extent, some value to the dependent variable. Backward Elimination first will have to be started with a model having all variables. Gradually variables are eliminated one by one from the model unless and until the remaining variables in the model have noteworthy values, which are greater than present values. We start with all the predictors variables in the model, remove the predictor with highest p-value higher than the critical value, and subsequently obtained six independent variables, which are used gradually to regress on dependent variable (ROA) in respective bank merger. Six independent variables are Capital adequacy ratio (CAR), Credit deposit ratio (CDR), Spread as a percentage of total assets (STA), other operating expense to total expenses ratio (OOETE), Net non-performing asset ratio (NNPANA) and non-interest income to total income (NIITI) into our analysis because these variables are free from multicollinearity and one dependent variable (ROA) indicating profitability is considered.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon$$

Where,

Y = Return on Assets (RoA)

X_1 = Spread Ratio (STA)

X_2 = Credit-Deposit Ratio (CDR)

X_3 = Capital Adequacy Ratio (CAR)

X_4 = Other Operating Expense to Total Expenses (OOETE)

X_5 = Non-Performing Asset to Net Assets Ratio (NNPANA)

X_6 = Non-Interest Income to Total Interest Ratio (NIITI)

ε_t represents the “noise” or error term; α and β_i represent the slope and coefficient of regression. The coefficient of regression, β indicates how a unit change in the independent variables [in our study, Spread Ratio (STA), Credit-Deposit Ratio (CDR), Capital Adequacy Ratio (CAR), Other Operating Expense to Total Expenses (OOETE), Non-Performing Asset to Net Assets Ratio (NNPANA), Non-Interest Income to Total Interest Ratio (NIITI) etc] affects the dependent variable [Return on Assets (RoA)]. The error ε_t is incorporated in the equation to cater for other factors that may influence Return on Assets (ROA). The legitimacy or power of the Ordinary Least Squares (OLS) method depends on the correctness of presumptions. The Gauss-Markov assumptions are applied in this study. The assumption is that there is a linear co-relation between the dependent and independent variables. There is no co-relation between regressors and error term (heterogeneity). There is no perfect co-relation among predictors variable and the data have been selected randomly from the population (randomness). The procedure involves specifying the dependent and predictor variables. However, it depends on the assumptions that outliers can adversely affect the results of the methods.

5.13 Autocorrelation test:

In estimating regression equation by Ordinary Least Squares (OLS) method, time series data are generally co-related serially with their lagged values. Serial co-relation indicates that OLS technique in estimating regression equation are not an efficient linear estimator.

Standard errors are incorrectly estimated more precisely their overestimated and prominently OLS technique become biased and inconsistent. The output of auto correlation lies within the range of +1 (a perfect positive correlation) and -1 (perfect negative correlation).

(i) Durbin Watson Statistic:

In regression analysis, auto correlation in the residuals is indicated by 'Durbin Watson Statistic', which is nothing but a number that lies in a range of specific number interval. Value 0-4 is the stipulated range for Durbin-Watson test. There may be no auto correlation, positive auto correlation and negative auto correlation. There may be no auto correlation, if the DW value approaching to 2, positive correlation, if the DW value approaching to 0 and negative correlation, if the DW value toward 4.

The test statistic is calculated with the following formula:

$$DW = d = \frac{\sum_{t=2}^T (e_t - e_{t-1})^2}{\sum_{t=2}^T e_t^2}$$

Where, $e_i = y_i - \hat{y}_i$ are the residuals, y_i and \hat{y}_i = the observed and predicted values respectively.

n = the number elements in the sample.

The Hypotheses for the Durbin Watson test are:

H_0 = no first order autocorrelation.

H_1 = first order correlation exists.

(ii) Breusch-Godfrey test:

Breusch-Godfrey (BG) test is an alternative to the Durbin-Watson (DW) Test. DW test is valid for only first order auto regression, whereas BG test is applicable for pre-determined designated higher order values.

The null hypothesis of the Breusch-Godfrey test: H_0 : There is no auto correlation of any order (up to p). BG model is statistically stronger than DW test.

In order to estimate autocorrelation by the Breusch-Godfrey test, by OLS technique, we first estimate and save residuals and then we find out another regression and degenerate the current value of residual on all of the predictors variables, and as many lagged residual terms. The Breusch-Godfrey statistic is given by: $(T - p) \cdot R^2$ where T = number of observations, p = number of lagged residual terms. Therefore, the number of observations multiplied by R^2 is the Breusch-Godfrey test statistic

1. H_0 : this regression will explain very little (i.e., no autocorrelation). The statistic is distributed chi-squared, with p degrees of freedom.
2. Reject H_0 if the p-value of the Breusch-Godfrey statistic is less than 0.05.

5.14 Key Variables under consideration for conducting regression analysis and for checking stationery:

Backward Elimination first will have to be started with a model having all variables. Gradually variables are eliminated one by one from the model unless and until the remaining variables in the model have noteworthy values, which are greater than present values. We start with all the predictors variables in the model, remove the predictor with

highest p-value higher than the critical value, and subsequently obtained six independent variables, which are used gradually to regress on dependent variable (ROA) in respective bank merger. Six independent variables are Capital adequacy ratio (CAR), Credit deposit ratio (CDR), Spread as a percentage of total assets (STA), other operating expense to total expenses ratio (OOETE), Net non-performing asset ratio (NNPANA) and non-interest income to total income (NIITI) into our analysis because these variables are free from multicollinearity and one dependent variable (ROA) indicating profitability is considered.

Return on Assets (ROA) is the dependent variable for assessing the performance of before and after merger of banks. ROA indicates the bank's capability to change its asset into income. ROA is applied as a profitability measurement ratio. By using ROA, investor can easily get an idea about effective management of banks. Higher ROA means the better earning capacity of banks and creating more value for the stakeholders. ROA is dependent variable and it depend upon the various factors of the bank. It creates the positive relationship of bank's income and assets. ROA is the important measures (Paul Kupiec and Yan Lee, 2012). It gives an idea of the productivity of the management in converting its assets to earn income. The upward ratio highlights that the management is efficiently utilizing its assets. This ratio is calculated by income/profit before tax to assets and it is normally disclosed as a percentage. ROA is expressed by the following formula: Return on Assets Ratio = Profit before tax/ TA (Total Assets) X 100. This ratio indicates the earning capability of the banks from each rupee of assets they control.

In our study, we use six predictor's variables and one dependent variable. The banks have used the following independent variables as under: Spread as % of total assets

(STA), Credit-deposit ratio (CDR), Capital adequacy ratio (CAR), Other operating expenses to total expenses (OOETE), Net NPA as a % of net advances (NNPANA) and non-interest income to total interest (NIITI).

5.15. Hypotheses for conducting regression analysis:

The present study attempts to test a number of hypotheses which as below:

H₁: There is affirmative connection between spread to total assets (STA) and ROA in post-merger period.

H₂: There is affirmative connection between CDR (credit deposit ratio) and ROA in post-merger period.

H₃: There is affirmative connection between CAR (capital adequacy ratio) and ROA in post-merger period.

H₄: There is adverse connection between OOETC (other Operating expenses as % of total expenses) and ROA in post-merger period.

H₅: There is adverse connection between NNPANA (Net NPA as a % of net assets) and ROA in post-merger period.

H₆: There is affirmative connection between NIITI (Non-interest income as a % total interest) and ROA in post-merger period.

5.16. Stationary test (Unit Root test):

The number of econometric matters can affect the guess of parameters, while dealing with time series data under OLS. The OLS technique (Ordinary Least Square) may provide a very high R-Square, if we regress one time series variable on other time series variable but there may not exist any consequential relationship among variables. This

position highlights the difficulty of spurious regression between fully unrelated variables, which is reproduced by non-stationery process. The initial steps for suitable analysis is to decide whether time series data are stationery or not. Generally, most of the macro-economic data are non-stationery by nature. It means that they always try to display a deterministic trend. Therefore, they experience unit root. As a results of non-stationarity, if we run regression analysis, the time series data will reflect most likely spurious results. This problem of spurious regression have been resolved by Granger and Newbold (1974). To ensure stationarity of time series data, ADF test [adopted from Dickey and Fuller (1979, 1981)] has been applied in the study. A time series is called stationery, if there exist time invariant mean and variance. This means that mean and variance of Y (time series data) are constant with the passage of time. Therefore, before running regression analysis, stationery test is very vital aspect in adopting econometric methodology in any kind of search. Following equation checks the stationarity of time series data used in our study:

$$\Delta y_t = \beta_1 + \beta_1 t + \alpha y_{t-1} + \gamma_1 \sum \Delta y_{t-1} + \varepsilon_t$$

Where ε_t is white noise error term in the model of unit root test, with a null hypothesis that variable has unit root. The ADF, which reveal whether there exist unit root of y_t will present all variables at time t in the form of natural logarithmic. For testing ADF, null hypothesis $H_0: \alpha = 0$, Alternative hypothesis $H_1: \alpha < 0$. If the coefficient is not zero, the null hypothesis is rejected. Therefore, if we reject null hypothesis, it indicate that series is stationery. More elaborately, it can be explain that if t-statistic for ADF is less than critical t values, then null hypothesis of unit root is accepted, which induce us to conclude that non-stationarity exist at levels.

B. Methodology based on executives (primary) survey on merger of Indian commercial banks:

The collection of primary data from executives of several parts of India was used, which was collected through administration of questionnaires to acquire a precise and recent understanding of the on the effect of M&As (merger and acquisitions) in Indian banking industry. First, we attempt to place explanatory analysis of the common data from the respondents. It encloses demographic sketch such as title of jobs, survey area, academic profile, experience and knowledge about the sectors of the executives etc. Second, examines the executive's observation and perception about the M&As of banks and accordingly ranking/rating has been put in view of importance given by the executives/respondents. There are various avenues of doing the survey with the executives or respondents. Researchers normally follow the face-to-face interaction with the interviewers, tele calling interview and self-structure questionnaire based upon the feedback or suggestions received through primary interaction with the respondent., In our study, we have taken self-structure questionnaire method for accumulating information from executives' or respondents primarily on the reasons of the following advantages such as (a) economical or low cost of collecting of data; (b) quick collection of date because of digital intervention and (c) quicker analysis of data by using software package etc.

This empirical study is primarily based at New Delhi, India as the researcher has been working in various private sector organization for a long period. The researcher has accessed over north India and other parts of the country because of internet and other digital facilities and moreover, data has been collected from the respondent by sending

self-administered questionnaire on PAN India basis. The final questionnaire comprising 15 questions in pdf format has been finalized based on the initial discussion with various industry experts, scholar and professional in financial sectors. The self-structure questionnaires were distributed among nearly 160 executives/respondents with a request letter describing briefly the object of the research and confirming the privacy of the view given by the executives/respondents. The tenure of the study is for a period of approximately 3-4 months commencing from March 2018. The responses from respondents/executives were received in the PDF format of the questionnaire after giving numerous reminders over phone, e-mail etc. After examining 115 duly filled in questionnaire, 107 were found to be fit and proper for our use and the balance 8 questionnaire are excluded on reason of inappropriateness (incomplete in nature). For analysis of the result, Likert's scoring system was used which comprises of five categories scoring such as: (a) strongly agree (SA); (b) agree (A); (c) undecided (U); (d) disagree (DA) and (e) strongly disagree (SD). This system has been pragmatic to each item of the questionnaire assessing insight of executives on merger issues of Indian commercial banks. The Likert's scoring system weights have been assigned as:

- (i) 5: Strongly agree (SA)trongly agree (SA),
- (ii) 4; Agree (A),
- (iii) 3: Undecided (U) ,
- (iv) 2: Disagree (DA) and
- (v) 1: Strongly disagree (SD)

The complete questionnaire may be explained and presented below:

Q 1: Inorganic growth:

Growth of bank can be happened through internal (organic path) and external (inorganic path) means. Merger & Acquisition (M&A) can be considered as an inorganic strategy of growth. In the current environment, inorganic strategy has become a vital for achieving growth of bank. Do you agree this statement?

Q2: Corporate Governance:

Corporate Governance is a process that aims to strive for excellence in business operations through transparency, ethical way and accountability to its stakeholders, Government and others who deal with the bank. Do you believe that Merger & Acquisition (M&A) creates better corporate governance on merged/transferee bank?

Q3: Shareholders' value:

Consolidation through Merger & Acquisition (M&A) is the strategy followed by bank looking for enhanced value creation. Can Merger & Acquisition (M&A) strategy impact on increasing shareholders' value on merged/transferee bank?

Q4: NPA (Non-Performing Assets) reduction:

Non-performing Assets (NPA) is one of the big concern of the banks at the present era. It has negative impact on creating shareholders' value. Do you believe that Merger & Acquisition (M&A) strategy can reduce NPS in merged/transferee bank?

Q5: Size advantage:

Indian banking industry has recognized the size advantage "i.e.in term of assets" when it confronts competition with other banks and also size would be bringing down the transaction costs. Do you believe that the consolidation via merger & acquisition (M&A) can create the size advantage of merged/transferee bank?

Q6: Financial Inclusion:

Financial Inclusion refers to delivery of banking services to masses including privileged and disadvantaged people at an affordable terms and conditions. Can merger & acquisition (M&A) help to achieve the financial inclusion to achieve economic growth and development of merged bank as well as country?

Q7: CSR (Corporate Social Responsibility):

The corporate Social Responsibility (CSR) of bank contributes to the creation of Shareholders value. Do you believe that there is an empirical correlation between the adoption of societal responsibility and a bank's economics success with special reference to Merger & Acquisition (M&A)?

Apart from the above statements, consolidation of banks through Merger & Acquisition (M&A) has gained momentum because of the various other factors, which has as impact on creation of shareholders value. To what extent, do you agree with the following statement?

Q 8: Enhancement of customer base

The merged banks after setting goals for retention of customer, making the customer experience an integral part of merger planning, finding new ways to improve the customer base, communicating and listening with customers and empowering customer to provide better service, Banks can turn M&As into a sign of better things to improve their customers base. To what extent, do you agree with the statement?

Q 9: Entry into a new geographical area

The banks can improve market share by entering in new markets or by increasing branch networks. The, strong banks use the acquisition route to buyout an established player in a new market and then build upon the existing platform. The merged banks will have

presence in strong geographic markets. It gives the opportunity to grow with the merged banks as well as the economic growth of the country. To what extent, do you agree with the statement?

Q 10: Create a cost advantage

Lowering cost is the key driving objects to achieve operational efficiency in M&A. This refers to the fact that the combined merged bank can often reduce duplicate departments or operations, lowering the costs of the bank relative to the same revenue stream, thus increasing profit in turn rises value of the firm. To what extent, do you agree with the statement?

Q 11: Acquisition of new brand quality

A bank acquires one with a superior brand image that affects the acquirer's brand equity (perceived quality and brand loyalty). This study examines how brand equity of a merged bank changes after M&A. Results show that the greater the perceived, the more the brand equity of the merged bank will increase. To what extent, do you agree with the statement?

Q 12: Risk and market perception

The merged bank may have to recalibrate their perceptions of risk and their due diligence process to mitigate risk factors that the bank may face in post –merger period. To what extent, do you agree with the statement?

Q 13: Cultural and Human Resources Integration

The success of M&A of banks depends on how well a merged bank deals with issues related to its people and cultural integration. The role of HR becomes very important in this matter. The merged bank should be wary of this critical issue and keep their eyes and

ears open at every stage of the implementation. To what extent, do you agree with the statement?

Q 14: Technological advantage

The success of M&A of bank depends upon greatly on how well the IT integration is accomplished. IT brings short-and long-term benefits that cannot be ignored by enabling synergies and creating cost saving for merged bank. In post-merger integration, the role of IT not only brings real results but also it is often the difference between a successful merger and one that never meets expectation. To what extent, do you agree with the statement?

Q 15: Compliances with new Legislation

The process of M&As in India is court driven, long drawn and hence problematic. The entire process of M&A has to be to the satisfaction of the Court. E-governance could provide a helpful tool to achieve the desired object with less time. To what extent, do you agree with the statement?