Journal of Poverty, Investment and Development
ISSN 2422-846X An International Peer-reviewed Journal
Vol.39, 2017

Impact of Merger on Performance of Indian Public Sector Bank: A Case Study of Global Trust Bank and Oriental Bank of Commerce

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Abstract
The article tries to assess the impact of mergers and acquisitions on profitability and operating performance of Indian public sector bank in the Indian banking sector taking into consideration the case of merger of Global Trust Bank (GTB), Oriental bank of Commerce (OBC). Wilcoxon signed rank test for those variables like CDR, IDR, OOETE, NIIAWF, OPAWF where significant departure from normality assumption is noticed, suggests that there is no significant difference between the pre and the post-merger performance on the basis of CDR, IDR, OOETE, NIIAWF, OPAWF of the said bank. On the other hand, paired samples t test for other 12 variables where normality assumption is not violated, suggests that significant differences between pre and post M&A (CDR pre & CDR post),(OOETE pre & OOETE post) and), (IDR pre & IDR post), (NIIAWFpre & NIIAWF post), (OPAWF pre & OPAWF post) are found out. On the other hand, the means of other pre and post merger ratio values are not different significantly. On the basis of the results of granger causality test, we can conclude that there exist unidirectional causality between return on asset (ROA) and operating expenses to total expenses ratio (OOETE), return on asset (ROA) and non interest income total income (NIITI) respectively but not vice versa. Here, unidirectional causality runs from return on asset (ROA) to total expenses ratio(OOETE) and from non interest income total income(NIITI) to return on asset (ROA).
Keywords: Merger, India, Global Trust Bank, Oriental bank of Commerce.

1. Introduction

The process of globalization and liberalization has strongly influenced the Indian banking sector. The banking sector reforms undertaken in India from 1992 onwards were aimed at ensuring the safety and soundness of financial institutions and at the same time making them efficient, functionally diverse and competitive. Financial sector reforms provided banks with operational flexibility and functional autonomy. Apart from achieving greater efficiency by introducing competition through the new private sector banks and increased operational autonomy to public sector banks, reforms in the banking system were also aimed at enhancing financial inclusion, funding of economic growth and better customer service to the public. In February 2005, with a view to further enhancing the efficiency and stability of the banking system, a two-track and gradualist approach was adopted by the Reserve Bank. One track was consolidation of the domestic banking system in both the public and private sectors. The second track was gradual enhancement of the presence of foreign banks in a synchronized manner.

Very recently, the Indian banking industry has recognized that size matters a lot when it confronts competition with other banks. Size would bring economies of scale by bringing down the transaction costs. The larger size will enable Indian banks to face competition arising from foreign banks and would also strengthen them to expand business in overseas markets. By recent decision of consolidation of four small public sector banks like Canara bank,Vijaya bank, Syndicate bank and Dena bank during June,2017, India government wants now fewer, stronger and bigger state run bank by reducing number of public sector banks from 21 to 10-12.

The collapse of GTB resulted from many mistakes committed by the bank's management. GTB's problems started in 2000 and the imposition of the moratorium finally ended its independent existence. RBI's probe into GTB's accounts revealed a significant erosion of the bank's net worth and huge number of NPAs reflected its weak financials. Moreover, GTB's attempts to strengthen its capital base through investments from overseas failed due to regulatory problems, resulting in the total collapse of the bank.On July 26, 2004, RBI announced that GTB would be merged with the Oriental Bank of Commerce (OBC). As per the scheme, OBC took over all the assets and liabilities of GTB on its books. It acquired all 104 branches of GTB, 275 ATMs, a workforce of 1400 employees and one million customers at an estimated merger cost of Rs. 8 billion. OBC's total business volume was expected to reach Rs 65 billion and the total branch network to cross 1,100. All corporate accounts including salary accounts were transferred to OBC. The entire amount of paid-up equity capital of GTB was adjusted towards its liabilities. There was no share swap between GTB and OBC, which meant that GTB shareholders were the ultimate losers, as they did not get any shares of OBC. Moreover, OBC enjoyed a huge tax break by acquiring GTB's NPAs worth Rs 1.2 billion and impaired assets of Rs. 3 billion. Analysts opined that

the merger of Global Trust Bank (GTB) with Oriental bank of Commerce (OBC) will be beneficial to both the banks.

Therefore, the objective of this study is to explore the impact of mergers and acquisitions on profitability and operating performance of Indian public sector bank in the Indian banking sector taking into consideration the case of merger of Global Trust Bank (GTB) with Oriental bank of Commerce (OBC) will be beneficial to both the banks. We aim to examine whether M&A in this sector have led to the improvement in performance of the merging banks or has the performance deteriorated after the merged entity was formed.

2. Methodology

The secondary data which has been collected was subjected to descriptive and inferential analysis. This study has attempted to test the hypotheses relating to the impact of M&A on the various performance parameters and thus derive a conclusion about whether the event of M&A has made a positive impact on the performance of these banks-Oriental bank of Commerce and Global Trust Bank. The software SPSS 20.0, E.Views and MS Excel were used to compute and analyze the data.

The ratios for each of the performance parameters were estimated for the above mentioned merger individually. This was followed by the Shapiro-Wilk normality test. On the basis of 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 compared means of the performance parameter over time i.e. before the merger vs after the 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 also conducted to test of normality. The different parameters chosen for study were ROA, CDR, IDR, PSA, DPE, APE, IITI, NIITI, IETE, EETE, OOETE, STA, IIAWF, NIIAWF, OPAWF, NNPANA, CAR.

2.1. Kolmogorov-Smirnov test

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

2.2. Shapiro–Wilk 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.

Shapiro Wilks W Test

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

W is the test statistic

W is insignificant if the variable's distribution is not different from normal

- W ≈ the correlation between given data and ideal normal scores
- W = 1 when your sample - variable data are perfectly normal (perfect H0)
- When W is significantly smaller than 1 = non - normal (Ha is accepted)
- Shapiro - Wilk's W is recommended for small and medium samples up to n = 2000

2.3. Paired Sample T Test

It checks whether there is any significant change in normal return before and after the announcement of the M&A event. The hypotheses for the test is stated below (Bhaumik and Selarka, 2008).

H_O: There is no significant difference in normal return due to the occurrence of the event.

H_1: There is a significant difference in normal return due to the occurrence of the event .

The hypotheses can be expressed in two different ways that express 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 0")

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

2.4. Wilcoxon Signed-Ranks Test:

The Wilcoxon Signed-Rank test is a non-parametric statistical hypothesis test used when comparing two related samples, matched samples, or repeated measurements on a single sample to assess whether their population mean ranks differ (i.e. it is a paired difference test). It can be used as an alternative 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 distributed. As the Wilcoxon signed rank test does not assume normality in the data, it can be used when this assumption has been violated and the use of dependent t- test is inappropriate. Therefore, it is the non-parametric version of a paired samples t-test. It is used when the difference between the two variables is abnormally distributed. It analyses the difference between the paired observations, taking into account the magnitude of the differences.

The assumption lying behind Wilcoxon Signed-Ranks Test is that data is paired and comes from the same population, each pair is chosen randomly and independently and The data are measured at least on an ordinal scale(i.e., they cannot be nominal).

2.5. Stationarity Test (Unit Root Test)

When dealing with time series data, a number of econometric issues can influence the estimation of parameters using OLS. Regressing a time series variable on another time series variable using the Ordinary Least Squares (OLS) estimation can obtain a very high R^2, although there is no meaningful relationship between the variables. This situation reflects the problem of spurious regression between totally unrelated variables generated by a non-stationary process. The first step for an appropriate analysis is to determine if the data series are stationary or not. Time series data(specially most macro economic data) generally tend to be non-stationary, i.e. they tend to exhibit a deterministic and/or stochastic trend and thus they suffer from unit roots. Due to the non-stationarity, regressions with time series data are very likely to result in spurious results. The problems stemming from spurious regression have been described by Granger and Newbold (1974). In order to ensure the condition of stationarity, a series ought to be integrated to the order of 0 [I(0)]. In this study, tests of stationarity, commonly known as unit root tests, were adopted from Dickey and Fuller (1979, 1981) Therefore, econometric methodology needs to examine the stationarity; for each individual time series, are non stationary, Therefore, it is recommended that a stationarity (unit root) test be carried out to test for the order of integration. A series is said to be stationary if the mean and variance are time-invariant. A non-stationary time series will have a time dependent mean or make sure that the variables are stationary, because if they are not, the standard assumptions for asymptotic analysis in the Granger test will not be valid. Therefore, a stochastic process that is said to be stationary simply implies that the mean [$(E(Y_t)$] and the variance [Var (Y_t)] of Y remain constant over time for all t, and the covariance [covar (Y_t, Ys)] and hence the correlation between any two values of Y taken from different time periods depends on the difference apart in time between the two values for all t≠s. Since standard regression analysis requires that data series be stationary, it is obviously important that we first test for this requirement to determine whether the series used in the regression process is a difference stationary or a trend stationary. The Augmented Dickey-Fuller (ADF) test is used. To test the stationary of variables, we use the Augmented Dickey Fuller (ADF) test which is mostly used to test for unit root. Following equation checks the stationarity of time series data used in the study:

$$\Delta y_t = \beta_1 + \beta_1 t + \alpha y_{t-1} + \gamma \Sigma \Delta y_{t-1} + \varepsilon_t \quad \text{-----(4)}$$

Where ε_t is white nose error term in the model of unit root test, with a null hypothesis that variable has unit root. The ADF regression test for the existence of unit root of y_t that represents all variables (in the natural logarithmic form) at time t. The test for a unit root is conducted on the coefficient of y_{t-1} in the regression. If the coefficient is significantly different from zero (less than zero) then the hypothesis that y contains a unit root is rejected. The null and alternative hypothesis for the existence of unit root in variable y_t is H_0; $\alpha = 0$ versus H_1: $\alpha < 0$. Rejection of the null hypothesis denotes stationary in the series.

If the ADF test-statistic (t-statistic) is less (in the absolute value) than the Mackinnon critical t-values, the null hypothesis of a unit root can not be rejected for the time series and hence, one can conclude that the series is non-stationary at their levels. The unit root test tests for the existence of a unit root in two cases: with intercept only and with intercept and trend to take into the account the impact of the trend on the series.

2.6. Key Variables under consideration of our study:

We have taken following six independent variables Capital adequacy ratio (CAR), Credit deposit ratio (CDR), spread as a percentage of assets(STA) , operating expense ratio (OOETE) , net non-performing asset ratio(NNPANA), non-interest income (NIITI) ,into our analysis because these variables are free from multicollinearity and also one dependent variable indicating profitability (ROA) is considered.

Profitability of the banks can be examined with the help of number of parameters. One of such parameter is ROA. Return on assets is an indicator of how profitable a company is relative to its total assets. It gives an idea

of the efficiency of the management in using its assets to generate earnings. Dependent variable for the purpose of study is Return on Assets of banks. Bank profitability can be measured through various factors; return on assets (ROA) is one of the important measures (Paul Kupiec and Yan Lee, 2012). This ratio is connected with bank profit and the total assets. Return on assets is an indicator of how profitable a company is relative to its total assets. It gives an idea of the efficiency of the management in using its assets to generate earnings. The higher ratio indicates that the management is efficiently utilizing its assets. This ratio is calculated by profit before tax to total assets of the bank and it is expressed as a percentage. The Return on Assets is defined by the following formula. Return on Assets Ratio = Profit before Tax/ Total Assets X 100. This ratio indicates how many rupees of earnings the bank derive from each rupee of assets they control.

1. Spread Ratio (STA) (Spread/Total Assets): Spread is the difference between interest earned and interest paid. The ratio is calculated as a percentage spread to total assets. The higher the ratio, the more will be the profitability.
2. Credit-Deposit (CDR) Ratio (Total advances/Total deposits). Higher the CD ratio, higher is the utilization of depositor's money which helps banks to earn higher return on their assets. A high LDR indicates two things, firstly the bank is issuing out more of its deposits in the form of interest bearing loans; secondly the bank generates more income. Here the problem is failure in repayment of loan, in such a case the banks liable to repay the deposit money to their customers, so the ratio is too high puts the bank at high risk. Alternatively a very low ratio means bank is at low risk, on the same time it is not using assets to generate income.
3. Capital Adequacy Ratio (CAR) (Capital/Risk weighted assets): In the adoption of risk management strategies by a bank, the ratio determines the cushion available to a bank against the credit risk, operational risk and market risk.
4. Operating Expense (OOETE) Ratio (Operating Expenses/Total expenses): The ratio has a negative relationship with profitability, and a high OE ratio highlights operational inefficiency of a bank.
5. Non-Interest Income (NIITI): (Non interest income /total assets) Non interest income refers to the Income of a bank from its allied and non-banking activities. Banks should aim to increase their non interest income to enhance their return on assets.
6. Net Non-Performing Asset (NNPANA) ratio (NNPA/Net Total assets): The ratio bears a negative relationship with profitability as it indicates the credit risk of a bank.

Table 1: Summary of Variables, description and measurement

Variable	Explanation	Measurement
Dependent Variable/Regressed		
ROA	Return on Bank's total assets	Net Profit divided by average total asset
Independent Variables/Regressor		
STA	Spread Ratio (Spread is the difference between interest earned and interest paid)	Calculated as a percentage spread to total assets.
CDR	Credit-Deposit Ratio	Total advances divided by Total deposits
CAR	Capital adequacy as a measure of solvency level forced by Capital depletion	(Tier 1 capital+Tier 2 capital) divided by Risk weighted assets
OOETE	Operating expenses to total expenses ratio highlighting operational efficiency of a bank.	Operating Expenses divided by Total expenses
NIITI	Non interest income to total assets ratio. Non interest income refers to the Income of a bank from its allied and non-banking activities.	Non Interest Income divided by Total Assets
NNPANA	Net Non Performing Assets to Net Total Assets	Net Non Performing Assets divided by Net Total Assets

Source: *Author's own estimate*

2.7. Granger Causality test :

Causality is a kind of statistical feedback concept which is widely used in the building of forecasting models. Historically, Granger (1969) were the ones who formalized the application of causality in economics. and Sim (1972) Granger causality test is a technique for determining whether one time series is significant in forecasting another (Granger, 1969). The standard Granger causality test (Granger, 1988) seeks to determine whether past values of a variable helps to predict changes in another variable. The definition states that in the conditional distribution, lagged values of Y_t add no information to explanation of movements of X_t beyond that provided by lagged values of X_t itself (Green, 2003). We should take note of the fact that the Granger causality technique measures the information given by one variable in explaining the latest value of another variable. In addition, it

also says that variable Y is Granger caused by variable X if variable X assists in predicting the value of variable Y. If this is the case, it means that the lagged values of variable X are statistically significant in explaining variable Y. The null hypothesis (H_0) that we test in this case is that the X variable does not Granger cause variable Y and variable Y does not Granger cause variable X. In summary, one variable (X_t) is said to granger cause another variable (Y_t) if the lagged values of X_t can predict Y_t and vice-versa.

2.8. Autocorrelation test:

In Ordinary Least Squares (OLS) regression, time series residuals are often found to be serially correlated with their own lagged values. Serial correlation means (a) OLS is no longer an efficient linear estimator, (b) standard errors are incorrect and generally overstated, and (c) OLS estimates are biased and inconsistent .This test is an alternative to the Q-Statistic for testing for serial correlation. It is available for residuals from OLS, and the original regression may include autoregressive (AR) terms.

(i)Durbin Watson Statistic

'Durbin Watson Statistic' is a number that tests for autocorrelation in the residuals from a statistical regression analysis. Durbin-Watson statistic is always between 0 and 4. A value of 2 means that there is no autocorrelation in the sample. Value approaching 0 indicate positive autocorrelation and values towards 4 indicate negative autocorrelation.

(ii)Breusch-Godfrey test:

Unlike the Durbin-Watson Test, the Breusch-Godfrey test may be used to test for serial correlation beyond the first order, and is valid in the presence of lagged dependent variables. The null hypothesis of the Breusch-Godfrey test is that there is no serial correlation up to the specified number of lags. The Breusch-Godfrey test regresses the residuals on the original regressors and lagged residuals up to the specified lag order. The number of observations multiplied by R^2 is the Breusch-Godfrey test statistic.

3. Analysis of results:

The Kolmogorov-Smirnov test assesses whether there is significant departure from normality in the population distribution for the bank mentioned above. The null hypothesis states that the normality assumption is not violated. The result of the normality shows that the significant value of CDR, IDR, OOETE, NIIAWF, OPAWF of the Oriental Bank of Commerce(OBCbank) during entire sample period 2000-01 to 2014-15(both pre-merger and post-merger) is less than 0.05, meaning that normality assumption has been violated. Since the significant values of each of the remaining variables (in table) is greater than 0.05, we do not reject the null hypothesis and conclude that these data do not violate the normality assumption.

Table 2: Kolmogorov-Smirnov test and Shapiro-Wilk test of normality

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CDR	.302	15	.001	.800	15	.004
IDR	.272	15	.004	.806	15	.004
PSA	.117	15	.200*	.943	15	.427
DPE	.177	15	.200*	.893	15	.073
APE	.152	15	.200*	.895	15	.079
IITI	.153	15	.200*	.916	15	.166
NIITI	.153	15	.200*	.916	15	.166
IETE	.167	15	.200*	.954	15	.597
EETE	.197	15	.122	.895	15	.079
OOETE	.238	15	.022	.797	15	.003
STA	.199	15	.113	.912	15	.146
IIAWF	.102	15	.200*	.967	15	.816
NIIAWF	.333	15	.000	.809	15	.005
OPAWF	.291	15	.001	.810	15	.005
ROA	.159	15	.200*	.972	15	.882
NNPANA	.200	15	.110	.873	15	.057
CAR	.160	15	.200*	.945	15	.447

a. Lilliefors Significance Correction
*. This is a lower bound of the true significance.

Source: *Author's own estimate*

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. Thus if the *p*-value is less than the chosen alpha level(0.05), then the null

hypothesis is rejected and there is evidence that the data tested are not from a normally distributed population. In other words, the data are not normal. On the contrary, if the *p*-value is greater than the chosen alpha level (0.05), then the null hypothesis that the data came from a normally distributed population cannot be rejected. The same result is also confirmed by the Shapiro-Wilk test.

Table 3: Wilcoxon Signed Ranks Test

Ranks				
		N	Mean Rank	Sum of Ranks
CDRpost - CDRpre	Negative Ranks	0[a]	.00	.00
	Positive Ranks	4[b]	2.50	10.00
	Ties	0[c]		
	Total	4		
IDRpost - IDRpre	Negative Ranks	4[d]	2.50	10.00
	Positive Ranks	0[e]	.00	.00
	Ties	0[f]		
	Total	4		
OOETEpost - OOETEpre	Negative Ranks	1[g]	1.00	1.00
	Positive Ranks	3[h]	3.00	9.00
	Ties	0[i]		
	Total	4		
NIIAWFpost - NIIAWFpre	Negative Ranks	3[j]	3.00	9.00
	Positive Ranks	1[k]	1.00	1.00
	Ties	0[l]		
	Total	4		
OPAWFpost - OPAWFpre	Negative Ranks	3[m]	3.00	9.00
	Positive Ranks	1[n]	1.00	1.00
	Ties	0[o]		
	Total	4		

a. CDRpost < CDRpre
b. CDRpost > CDRpre
c. CDRpost = CDRpre
d. IDRpost < IDRpre
e. IDRpost > IDRpre
f. IDRpost = IDRpre
g. OOETEpost < OOETEpre
h. OOETEpost > OOETEpre
i. OOETEpost = OOETEpre
j. NIIAWFpost < NIIAWFpre
k. NIIAWFpost > NIIAWFpre
l. NIIAWFpost = NIIAWFpre
m. OPAWFpost < OPAWFpre
n. OPAWFpost > OPAWFpre
o. OPAWFpost = OPAWFpre

Source: *Author's own estimate*

Table 3 shows that the negative mean rank is less than the positive mean rank in case of CDR and OOETE measure. This suggests that the Capital –Deposit Ratio measure (CDR) and Operating Expenses to Total expenses measure (OOETE) in post merger period is likely higher than that in the pre merger period. So we can infer that the phenomenon of merger has accentuated this performance parameter.

On the contrary, table 3 shows that the negative mean rank is higher than the positive mean rank in case of Investment –Deposit Ratio measure (IDR), Non-interest Income as % to average working funds(NIIAWF), Operating profit as % to average working funds (OPAWF). This suggests that the Investment –Deposit Ratio measure (IDR), Non-interest Income as % to average working funds(NIIAWF), Operating profit as % to average working funds (OPAWF) position in post merger period is likely lesser than that in the pre merger period. So we can infer that the phenomenon of merger has turned down the IDR, NIIAWF, and OPAWF position of the said public sector bank.

Table 4: Wilcoxon Test Ranks

Test Statistics[c]					
	CDRpost - CDRpre	IDRpost - IDRpre	OOETEpost - OOETEpre	NIIAWFpost - NIIAWFpre	OPAWFpost - OPAWFpre
Z	-1.826[a]	-1.826[b]	-1.461[a]	-1.461[b]	-1.461[b]
Asymp. Sig. (2-tailed)	.068	.068	.144	.144	.144

a. Based on negative ranks.
b. Based on positive ranks.
c. Wilcoxon Signed Ranks Test

Source: *Author's own estimate*

By applying the Wilcoxon signed rank test, we can see that for all the 5 ratios, the significance level is more than 0.05 (0.068 for CDR and IDR, 0.144 forOOETE, NIIAWF, OPAWF), therefore, the null hypothesis is accepted which indicates that there is no significant difference between the pre and the post-merger performance on the basis of CDR and IDR, OOETE, NIIAWF, OPAWF of the Oriental Bank of Commerce (OBCbank).

On the otherhand,the shortcut to the hypothesis testing of the Wilcoxon signed rank test is knowing the critical value for a 95% confidence interval(or a 5% level of significance) which is z=1.96 for a two tailed test and directionality. Whenever a test is based the normal distribution, the sample z value needs to be 1.96 or higher to reject the null hypothesis. However, for all 5 ratios above, sample z values are less than z=1.96 at 5% level of significance. Therefore, we have no other alternatives but to accept the null hypothesis at 5% level of significance signifying that there is no significant difference between the pre and the post-merger performance on the basis of CDR and IDR, for OOETE, NIIAWF, OPAWF of the Oriental Bank of Commerce (OBCbank).

But, if we compare the individual ratio, we have found that the post-merger IDR performance for all the two years has been better than the pre-merger period and reverse has happened in case of IETE, NNPANA ratio.

Table 5: Paired Samples Statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	IETEpre	62.902	4	6.0192	3.01
	IETEpost	69.80	4	5.91	2.955
Pair 2	PSApre	38.4225	4	0.2997	0.1498
	PSApost	34.4375	4	2.347	1.1736
Pair 3	DPEpre	218.625	4	33.576	16.788
	DPEpost	406.112	4	93.37	46.687
Pair 4	APEpre	111.655	4	26.360	13.18
	APEpost	266.594	4	85.44	42.72
Pair 5	IITIpre	86.47	4	3.717	1.858
	IITIpost	89.262	4	1.833	0.9169
Pair 6	NIITIpre	13.530	4	3.717	1.858
	NIITIpost	10.737	4	1.834	0.9169
Pair 7	EETEpre	10.365	4	0.9657	0.4829
	EETEpost	11.142	4	2.183	1.092
Pair 8	OPAWFpre	3.21	4	0.8743	0.4371
	OPAWFpost	1.995	4	0.4379	0.2189
Pair 9	STApre	3.0375	4	0.6806	0.3401
	STApost	2.42	4	0.4441	0.2227
Pair 10	NNPANApre	2.2225	4	1.40597	0.70299
	NNPANApost	.8150	4	0.39476	0.19738
Pair 11	CARpre	12.827	4	1.691	0.8455
	CARpost	11.575	4	1.586	0.7930
Pair 12	ROApre	1.175	4	0.4149	0.2076
	ROApost	1.407	4	0.4291	0.2145

Source: *Authors' own estimate*

Table-6: Paired Samples t Test

Pair	Variables (Pre-Post)	Paired Differences					t	df	Sig. (2 tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
1	IETEpre - IETEpost	-6.897	11.674	5.837	-25.474	11.679	-1.182	3	0.322
2	PSApre - PSApost	3.985	2.059	1.029	.7082	7.261	3.870	3	0.031
3	DPEpre - DPEpost	-187.48	62.96	31.48	-287.67	-87.30	-5.956	3	0.009
4	APEpre - APEpost	-154.93	59.71	29.85	-249.95	-59.92	-5.190	3	0.014
5	IITIpre - IITIpost	-2.792	5.448	2.72	-11.462	5.88	-1.025	3	0.381
6	NIITIpre - NIITIpost	2.792	5.448	2.724	-5.877	11.46	1.025	3	0.381
7	EETEpre - ETEpost	-0.7775	2.749	1.375	-5.153	3.59	-0.565	3	0.611
8	OPAWFpre - OPAWFpost	1.215	1.31	0.6550	-0.8695	3.30	1.855	3	0.161
9	STApre - STApost	0.6175	1.081	0.5409	-1.104	2.339	1.141	3	0.337
10	NNPANApre - NNPANApost	1.407	1.388	0.6942	-0.802	3.616	2.028	3	0.136
11	CARpre - CARpost	1.2525	1.871	0.9358	-1.726	4.23	1.338	3	0.273
12	ROApre - ROApost	-0.2325	0.8259	0.4129	-1.546	1.081	-0.563	3	0.613

Source: *Author's own estimate*

In case of pre and post merger Interest expenses as a % of total expenses ratio(IETEpre - IETEpost), since the calculated value of t (-1.182) for N=4 (as in Table 6) is lower than the table value (3.18245 at $t_{0.025}$,df =3), we accept the null hypothesis. The results are not significant at 0.05 level of significance (p=0.322). Therefore, the results of the above table show insignificant difference between pre and post M&A Interest expenses as a % of total expenses ratio, because the p-value is greater than 0.05. Therefore, after merger and acquisition taken place, there is no significant difference in the performance of the said Oriental Bank of Commerce (OBC) in India as H_0 is accepted. This indicates that the means of the pre and post merger Interest expenses as a % of total expenses ratio values are not different significantly.

Following the pattern of Interest expenses as a % of total expenses ratio(IETEpre - IETEpost), present study shows similar trend that there is no significant difference in case of pre and post merger interest income as a % of total income ratio(IITIpre& IITIpost), pre and post merger non interest income as a % of total income ratio (NIITIpre& NIITIpost), pre and post merger establishment expenses as a % of total expenses ratio (EETEpre & EETEpost), , pre and post merger return on total asset ratio (ROApre& ROApost), pre and post merger capital adequacy ratio(CARpre & CARpost), pre and post merger Net NPA as % to net advances ratio (NNPANApre& NNPANApost), pre and post merger Operating profit as % to average working funds ratio (OPAWFpre & OPAWFpost), pre and post merger Spread as a % to Assets ratio (STApre – STApost) performance.

Even some ratios individually depicts that there is slight increase or decrease in the financial performance of banks, but paired Samples t Test shows in this study that there is no significant impact. From Table 6, we observe that in pair 1, the post merger Interest expenses as a % of total expenses ratio mean is greater than that of the pre merger period. We, therefore, conclude that it is more likely to have been due to some systematic and deliberate cause. If all other confounds are eliminated, this systematic cause must have been the event of merger.

In case of pre and post merger Priority Sector Advance ratio (PSApre & PSApost), since the calculated value of t =3.870) for N=4 (as in pair 2 in table-6) is greater than the table value (3.18245 at $t_{0.025}$,df =3), we reject the null hypothesis. Therefore, the results are significant at 0.05 level of significance (p=0.031). Therefore, the results of the above table show significant difference between pre and post M&A priority sector advance ratio , because the p-value is less than 0.05. Therefore, after the merger and acquisition with Global Trust Bank, there is significant difference in the performance of the said Oriental Bank of Commerce in India in terms of priority sector advance ratio as H_0 is rejected. This indicates that the means of the pre and post merger priority sector advance ratio values are different significantly.

Likewise, in case of pre and post merger Deposit per employee (DPEpre& DPEpost), Advance per employee (APEpre& APEpost), since the calculated value of t (=5.956 and 5.190 respectively) for N=4 (as in pair 3 and 4 in table-6) is greater than the table value (3.18245 at $t_{0.025}$,df =3), we reject the null hypothesis. The results are significant at 0.05 level of significance (p=0.009and 0.014 respectively). Therefore, the results of the above table show significant difference between Pre and Post M&A (DPEpre & DPEpost) and (APEpre& APEpost) .This indicates that the means of the pre and post (DPEpre & DPEpost) and (APEpre& APEpost) ratio values are different significantly.

The diagnostic tests are performed to the equation regarding problems such as autocorrelation and heteroskedasticity. Diagnostics are necessary to establish the power of the results in respect to robustness, biasness and efficiency of the estimates. We have conducted different diagnostic tests in order to see whether our results are free from problem of autocorrelation.

Table 7: Residual Test

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.079926	Probability	0.270188
Obs*R-squared	3.525326	Probability	0.138286

Source: *Author's own estimate*

The top part of the output presents the test statistics and associated probability values. The Obs*R-squared statistic is the Breusch-Godfrey LM test statistic for the null hypothesis of no serial correlation. Since the calculated Breusch-Godfrey LM test statistic of 3.525326does not exceed the critical $\varkappa^2$ (1) value (i.e 3.84), we can not reject the hypothesis of no serial correlation up to lag order 1 at the 95% confidence level. The (effectively) high probability value(.>0.05) corresponding to 'Obs*R-squared' strongly indicates the absence of serial correlation in the residuals. Therefore, the result from diagnostic checking shows that model does not suffer form autocorrelation.

We have taken following six independent variables CAR, CDR, STA , OOETE , NNPANA, NIITI into our analysis because these variables are free from multicollinearity and also one dependent variable indicating profitability (ROA) is considered. From our analysis to test whether there exist multicolinearity, it is found that correlations among independent variables are moderate which do not exceed the general rule of thumb. Moreover tolerance for these variables are moderately high which also are beyond the specified minimum ceiling (0.10) and VIFs do not exceed the specified rule of thumb of10. This indicates that multicolinearity is not an issue of concern in this study (Result not shown).

Table:8: Unit Root Test: The Results of the Augmented Dickey Fuller (ADF) Test

Variables	Level/First difference	Calculated ADF	ADF critical value (at 5%)	Included in test equation	Inference
ROA	Level	-0.5488	-3.87	Intercept & Trend	Non-stationery
	First difference	-3.7578	-3.12	Intercept	Stationery
CAR	Level	-1.5772	-3.87	Intercept & Trend	Non-stationery
	First difference	-5.3165	-3.12	Intercept	Stationery
CDR	Level	-0.5414	-3.87	Intercept & Trend	Non-stationery
	First difference	--4.1320	-3.92	Intercept & Trend	Stationery
STA	Level	-1.6457	-3.87	Intercept & Trend	Non-stationery
	First difference	-3.7578	-3.12	Intercept	Stationery
OOETE	Level	-3.2406	-3.87	Intercept & Trend	Non-stationery
	First difference	-3.3689	-3.14	Intercept	Stationery
NNPANA	Level	-3.7029	-3.87	Intercept & Trend	Non-stationery
	First difference	-3.4376	-3.18	Intercept	Stationery
NIITI	Level	-2.8029	-3.79	Intercept & Trend	Non-stationery
	First difference	-3.2598	-3.12	Intercept	Stationery

Ho: series has unit root; H_1: series is trend stationary

Source: *Author's own estimate*

The decision on whether we analyze a time series in levels or differences is an important aspect of forecasting. Visual methods have been around for a long time. Relatively recently, statistical tests for the null hypothesis that the series is nonstationary, meaning that differencing is required, have been developed. Therefore, we should start test for stationery from intercept, intercept trend in level (i.e no differences) and if the result is non-stationery, data need to be differenced at intercept, intercept and trend respectively in first differences to attain stationery of time series. Table 8 presents the results of the unit root test. The results show that variable of our interest- namely return on assets (ROA) attained stationary at first differences [I(1)] using augmented Dickey Fuller Test. The results indicate that the null hypothesis of a unit root can be rejected for the given variable and, hence, one can conclude that the variable - return on assets (ROA) -is stationary at first differences [I(1)]. Thus the ADF tests also prove that the namely return on assets (ROA) series is stationary. Other variables like capital adequacy ratio (CAR), credit deposit ratio (CDR), spread on total assets (STA), other operating expenses to total expenses(OOETE), net non performing asset to net asset(NNPANA), non interest income to total assets(NIITI) have also attained stationary after first differencing I(1) signifying that they are integrated of order one, I (1). The results show consistency with different lag structures and to the presence of the intercept or intercept and trend.

Table:9 :Granger Causality test

Pairwise Granger Causality Tests				
Lags: 2				
Null Hypothesis:	Obs.	F-Statistic	Probability	
STA does not Granger Cause ROA	13	2.18007	0.17550	Accept
ROA does not Granger Cause STA		1.07407	0.38620	Accept
CDR does not Granger Cause ROA	13	3.67396	0.07382	Accept
ROA does not Granger Cause CDR		2.60422	0.13457	Accept
CAR does not Granger Cause ROA	13	2.55386	0.13876	Accept
ROA does not Granger Cause CAR		1.44026	0.29225	Accept
OOETE does not Granger Cause ROA	13	3.46676	0.08236	Accept
ROA does not Granger Cause OOETE		10.0824	0.04585	Reject
NNPANA does not Granger Cause ROA	13	2.50915	0.14261	Accept
ROA does not Granger Cause NNPANA		1.55621	0.26861	Accept
NIITI does not Granger Cause ROA	13	7.40326	0.01514	Reject
ROA does not Granger Cause NIITI		0.34978	0.71511	Accept

H_0: X does not granger cause Y

H_1: X granger causes Y

Source: *Author's own estimate*

The results of pair wise granger causality between return on asset (ROA) and different financial parameters of selected bank are contained in Table 9. We have found that there exist unidirectional causality between return on asset (ROA) and operating expenses to total expenses ratio(OOETE), return on asset (ROA) and non interest income total income(NIITI) respectively and not vice versa. Here, unidirectional causality runs from return on asset (ROA) to total expenses ratio(OOETE) and from non interest income total income(NIITI) to return on asset (ROA).No causality exist between return on asset (ROA) and spread to total asset ratio (STA), return on asset (ROA) and credit deposit ratio(CDR), return on asset (ROA) and capital adequacy ratio(CAR), return on asset (ROA) and net non-performing assets to net total assets ratio(NNPANA).

4. Conclusion:

The empirical findings suggest that out of the 17 ratios taken initially as operating performance indicators of merger case, 5 ratios namely CDR, IDR, OOETE, NIIAWF, OPAWF of the Oriental Bank of Commerce(OBC) during entire sample period 2000-01 to 2014-15(both pre-merger and post-merger) has violated normality assumption and other 12 ratios under our study satisfy normality assumption.

Wilcoxon signed rank test for those variables like CDR, IDR, OOETE, NIIAWF, OPAWF where significant departure from normality assumption is noticed, suggests that there is no significant difference between the pre and the post-merger performance on the basis of there is no significant difference between the pre and the post-merger performance on the basis of CDR and IDR, OOETE, NIIAWF, OPAWF of the Oriental Bank of Commerce(OBCbank).

But, by looking at individual ratio, we have found that the post-merger CDR , OOETE performance for all the years has been better than the pre-merger period and reverse has happened in case of IDR , NIIAWF, OPAWF ratio.

On the other hand, paired samples t test for other 12 variables where normality assumption is not violated, suggests that significant differences between pre and post M&A performance in (PSApre & PSApost), (DPEpre & DPEpost), (APEpre & APEpost) are found out. Even some ratios showed individually that there is slightly increase or decrease in the financial performance of banks, but paired samples t test suggests that there is no significant impact. Following the pattern of Interest expenses as a % of total expenses ratio(IETEpre - IETEpost), present study shows similar trend that there is no significant difference in case of pre and post merger interest income as a % of total income ratio(IITIpre& IITIpost), pre and post merger non interest income as a % of total income ratio (NIITIpre& NIITIpost), pre and post merger establishment expenses as a % of total expenses ratio (EETEpre & EETEpost), , pre and post merger return on total asset ratio (ROApre& ROApost), pre and post merger capital adequacy ratio(CARpre & CARpost), pre and post merger Net NPA as % to net advances ratio (NNPANApre& NNPANApost), pre and post merger Operating profit as % to average working funds ratio (OPAWFpre & OPAWFpost), pre and post merger Spread as a % to Assets ratio (STApre – STApost) performance.

On the basis of the results of granger causality test, we have found that there exist unidirectional causality between return on asset (ROA) and operating expenses to total expenses ratio(OOETE), return on asset (ROA) and non interest income total income(NIITI) respectively and not vice versa. Here, unidirectional causality runs from return on asset (ROA) to total expenses ratio(OOETE) and from non interest income total income(NIITI)

to return on asset (ROA).No causality exist between return on asset (ROA) and spread to total asset ratio (STA), return on asset (ROA) and credit deposit ratio(CDR), return on asset (ROA) and capital adequacy ratio(CAR), return on asset (ROA) and net non-performing assets to net total assets ratio(NNPANA).

It is recommended that the well-built banks should be merged with stronger banks to compete with foreign banks as well as to penetrate in the global financial market. Therefore, government and policy makers should be more cautious in advocating merger as a way to bring together economies of scale and scope.

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