



## INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, ECONOMICS AND MANAGEMENT

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**BASEL I NORMS: BOON OR BANE TO INDIAN PUBLIC SECTOR BANKS - A PRELUDE TO BASEL II NORMS**

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**ABSTRACT**

*The Basel capital accord (Basel I) had its major objectives of strengthening of the international banking system. The Indian public sector banking is not an exception. This study attempts to assess the outcome of implementation of the Basel I norms in case of the public sector banks in India. The outcome has been studied in terms of three parameters, namely, operating, efficiency and profitability, each with four variables adding to a total of twelve variables. Wilcoxon test has been used to assess the difference in parameters over the two periods all the four variables considered under the head 'operational performance' show significant improvement between the periods. Second, among the four variables studied under the head 'efficiency' the NPA/advances have reduced in period 2. Deposits/employee, advances/employee and net income/employee have increased in the second half. Third, scrutiny of the profitability condition shows moderate improvement due to better operation and efficiency. Out of the 12 variables 11 variables (excluding interest earned/total assets) exhibit highly significant improvement in the second half. Multiple correlation matrixes used to see the association between the variables and multiple regressions to find the linearity between the variables.*

**KEYWORDS**

Basel norms, efficiency performance, Operational performance, Profitability, Performance.

**HISTORY OF BASEL**

The Basel Committee was constituted by the Central Bank Governors of the G-10 countries in 1974. The G-10 Committee consists of members from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, Netherlands, Spain, Sweden, Switzerland, UK and US. These countries are represented by their Central Bank and also by the authority with onus for the prudent supervision of banking business where this is not the central bank. The Committee's Secretariat is located at the Bank for International Settlements in Basel, Switzerland. This committee meets four times a year. This committee on banking supervision provides a forum for regular cooperation on banking supervisory matters. Its objective is to enhance understanding of key supervisory issues and quality improvement of banking supervision worldwide. This committee is best known for its international standards on capital adequacy, the core principles of banking supervision and the concordat on cross-border banking supervision. Ever since its inception, the 1988 Accord was subject to extensive criticism, most of it directed at its "one hat fit all" approach.

In view of the idea dissatisfaction with Basel I, the Basel Committee proposed a New Capital Adequacy Framework (popularly referred to as Basel II) in June 1999 incorporating three major elements: (a) minimum capital requirements, based on weights intended to be more closely aligned to economic risks than the 1988 Accord; (b) supervisory review, which set basic standards for bank supervision to minimize regulatory arbitrage; and, (c) market discipline, which envisages greater levels of disclosure and standards of transparency by the banking system. Much of the concern about the Basel II stems from the first pillar of minimum capital requirements.

**IMPORTANCE OF THE STUDY**

The Basel Capital Accord of 1988 (Basel I) had its major objectives the strengthening of the international banking system, by promoting convergence of national capital standards, with a view to ironing out competitive inequalities among banks across countries. The reasons for the unquestioned acceptance of the Basel I norms by advanced as well as less developed countries, lay largely in the fact that it arrived on the scene precisely when most countries were seriously contemplating comprehensive financial sector reforms. In India too, the Narasimham Committee Reports I and II saw in the Accord a convenient peg, whereby to hang the entire agenda for the envisaged reforms in the banking sector. The following are the some of the policies implemented by the Basel committee under the head Basel I Norms in order to strengthen international banking:

|                |                                                                                                 |
|----------------|-------------------------------------------------------------------------------------------------|
| 1992 December  | A Frame work for measuring and managing liquidity                                               |
| 1993 April     | Supervisory treatment of market risks and interest risk                                         |
| 1994 July      | Amendment of Capital Accord in July 1998                                                        |
| 1995 April     | Treatment of potential exposure Basel capital                                                   |
| 1995 November  | Public disclosure of the trading and derivative activities of banks and securities of the firms |
| 1998 October   | Sound practices for loan accounting credit, credit risk disclosure and related matters          |
| 1999 January   | Sound practices for banks interactions with highly leveraged institutions                       |
| 2000 September | Principles for the Management of credit risk                                                    |

The Basel committee recommends the above policies to strengthen the international banking sectors. All banks have to introduce the Basel II norms with effect from 1st April 2009. This study has made an attempt to assess whether the policies implemented by the Basel I committee made any effect on the public sector banks in India and whether the public sector banks are ready to take over the challenges against the Basel II norms. The study is not on the basis of any particular policy implemented by Basel I norms but it covers the overall performance of the bank as a whole in view of the Basel I norms.

**OBJECTIVES OF THE STUDY**

The following are the main objectives of the study:

1. To analyze and compare the operational, efficiency and profitability conditions of the public sector banks after implementation of Basel I norms.
2. To study how far the three parameters are associated with one another in the study periods.
3. To analyse and identify the variables best predicting the ROA of public sector banks.

**METHODS AND DATA**

To study the above said objectives the data collected from various sources were subjected to analysis. The following parameters were taken to analyze the data:

**OPERATIONAL PARAMETER**

The following ratios were taken to evaluate the operational performance

1. Deposits/Total assets
2. Advances/Total assets
3. Advances/Deposits

## 4. Operating cost/Total assets

**EFFICIENCY PARAMETER**

To evaluate the efficiency of the banking sector the following ratios were used

1. Non-Performing Assets/Advances
2. Deposits per Employee
3. Advances per Employee
4. Net Income per Employee

**PROFITABILITY PARAMETER**

To compare the profitability positions between these two periods the following ratios were used:

1. Interest earned/total assets
2. Non interest income/total assets
3. Net income/equity
4. Net income/total assets

**SAMPLING TECHNIQUE**

Out of the State Banks of India and its associates, 5 banks were taken for the study and of the 19 nationalised banks, 14 were taken for the study. The selection of sample units was purely based on the availability of data after privatisation of public sector banks. The present study covers a total of 13 years starting from 1995-96 to 2007-08, divided into two sub-periods namely pre-Basel 1 starting from 1995-96 and ending with 2000-01 and post-Basel I norms from 2001-02 to 2007-08. Altogether there are 19 banks studied over a period 13 years adding up to 247 observations. To see the differences in different parameters in the two periods, Wilcoxon test was used. To study the extent of association among the different parameters for the whole period, multiple correlation matrixes were used. To study the linearity between ROA and other independent variables, multiple regressions were used. The study uses only secondary data, which were collected from CMIE (Centre for Monitoring Indian Economy Private Ltd.) prowess package. The data collected from this source have been used and complied with due care as per the requirement of the study. SPSS16 software package is used for statistical analysis.

The following hypotheses are tested in the present study.

**HYPOTHESES**

1. There is no differences in the operating performance in view of Basel I norms
2. The mean difference of efficiency parameter variables does not show any significant difference in view of Basel I norms
3. The variables taken under the head 'profitability parameter' did not show differences in view of Basel I norms
4. There is no association between operating ratios and efficiency ratios
5. There is no association between operating ratios and profitability ratios
6. There is no association between ROA with net interest income to total assets, non-performing assets to advances, net income per employee, interest earned to total assets, advances per employee, deposits per employee, operating cost to total assets
7. There is no linear relationship between ROA and the independent variables like NPA/advances, net income/equity, advances/total assets, advances/deposits, operating cost/total assets and interest earned/total assets.
8. The coefficient of all independent variables are equal to zero

**DISCUSSION ON OPERATING PERFORMANCE****TEST OF NORMALITY****HYPOTHESIS**

**H<sub>0</sub>:** The operating performance variables are not different from a normal distribution

**H<sub>1</sub>:** The operating performance variables are different from a normal distribution

**Test:** Kolmogorov-Smirnov test

**Significant level:** 95%

**Conclusion:** Significant at 0.000

It is good practice, once we have entered data, to test for normality of distribution. In this way we can be sure that our data has achieved an important assumption for parametric testing. Kolmogorov-Smirnov test is a more suitable test of normality of distribution if  $n > 50$ . These types of tests essentially test your data for goodness of fit against pre-calculated normally distributed values.

**TABLE-1: TEST OF NORMALITY FOR OPERATIONAL VARIABLES**

| Parameter             | Kolmogorov-Smirnov <sup>a</sup> |     |      |
|-----------------------|---------------------------------|-----|------|
|                       | Statistic                       | df  | Sig. |
| Deposits/Total Assets | .229                            | 133 | .000 |
| Advances/Total Assets | .121                            | 133 | .000 |
| Advances/Deposits     | .192                            | 133 | .000 |
| Op.cost/Total Assets  | .157                            | 133 | .000 |

a. Lilliefors Significance Correction

The table-1 shows that all the four variable values are less than 0.05 in the significance column of the output table stating that the data are not normally distributed data and has filled that requirement of non parametric test. Since the data are not normally distributed we use the non parametric test Wilcoxon test. It is equivalent to paired t-test in the case of parametric test.

**HYPOTHESIS**

**H<sub>0</sub>:** There is no difference in the operating performance in view of Basel I norms

**H<sub>1</sub>:** There is difference in the operating performance in view of Basel I norms

**Test:** Wilcoxon test

**Significance level:** 95%

**Conclusion:** Significant at .000

TABLE-2: WILCOXON TEST FOR OPERATIONAL VARIABLES Test Statistics<sup>c</sup>

|                        | Deposits/Total Assets | Advances/<br>Total Assets | Advances/Deposits   | Op.cost/Total Assets |
|------------------------|-----------------------|---------------------------|---------------------|----------------------|
| Z                      | -5.900 <sup>a</sup>   | -7.840 <sup>a</sup>       | -5.112 <sup>a</sup> | -10.031 <sup>b</sup> |
| Asymp. Sig. (2-tailed) | .000                  | .000                      | .000                | .000                 |

The Wilcoxon test, which evaluates the difference between mean of different variables for two different periods is highly significant. Deposits/Total Assets (z) = -5.9, p<0.001, Advances/Total Assets z= -7.84, p<0.001, Advances/Deposits z= -5.112, p<0.001, and Operating cost/Total Assets z= -10.031, p< .001. That is, the result indicates significant difference between the two periods. Based on the results produced from the table-2, the operating performance results shows significant different between two periods. The Wilcoxon test conducted to evaluate the above four variables rejects the null hypothesis.

**DISCUSSION ON EFFICIENCY****HYPOTHESIS**

**Ho:** The efficiency parameter variable values follow uniform distribution

**H1:** The efficiency parameter variable values do not follow uniform distribution

**Test:** Kolmogorov-Smirnov

**Significant level:** 95%

**Conclusion:** Significant at 0.000

TABLE-3 TEST OF NORMALITY FOR EFFICIENCY VARIABLES

|                     | Kolmogorov-Smirnov <sup>a</sup> |     |      |
|---------------------|---------------------------------|-----|------|
|                     | Statistic                       | df  | Sig. |
| NPA to Advances     | .262                            | 133 | .000 |
| Deposits/Employee   | .172                            | 133 | .000 |
| Advances/Employee   | .181                            | 133 | .000 |
| Net income/Employee | .226                            | 133 | .000 |

a. Lilliefors Significance Correction

Before we conduct any parametric test, we need to check that the data values come from an "approximately normal distribution." Hence the variables are tested with the help of Kolmogorov-Smirnov test. Table-3 shows high significance in all the efficiency variables - NPA to Advances, (p<0.001), Deposits/Employee (p<0.001), Advances/Employee (p<0.001), Net income/Employee are significantly different from normal (p<0.001). Since all the values are lesser than 0.05 in the significance column of the output table, it implies that the null hypothesis is rejected, accepting the alternative hypothesis stating that the data are not normally distributed. Hence we have applied Wilcoxon test.

**HYPOTHESIS**

**Ho:** The mean differences of efficiency parameter variables do not show any significant difference in view of Basel I norms

**H1:** The mean difference of efficiency parameter variables show significant difference in view of Basel I norms

**Test:** Wilcoxon test

**Significance level:** 95%

**Conclusion:** Significant at .000

TABLE-4: WILCOXON TEST FOR EFFICIENCY VARIABLES Test Statistics<sup>c</sup>

|                      | NPA to Advances     | Deposits/Employee    | Advances/<br>Employee | Net income/Employee  |
|----------------------|---------------------|----------------------|-----------------------|----------------------|
| Z                    | -8.448 <sup>a</sup> | -10.031 <sup>b</sup> | -10.031 <sup>b</sup>  | -10.031 <sup>b</sup> |
| Asymp.Sig.(2-tailed) | .000                | .000                 | .000                  | .000                 |

a. Based on positive ranks

b. Based on negative ranks

c. Wilcoxon Signed Ranks Test

A Wilcoxon test was conducted to evaluate whether the following four variables showed greater concern on impact of Basel I norms. NPA to Advances z=-8.448, p<0.001, Deposits/Employee z=-10.031, p<0.001 Advances/Employee z=-10.031 p<0.001 Net income/Employee z=10.031, p<0.001. The above values reject the null hypothesis stating that all the four variables showed significant difference in view of Basel I norms.

**DISCUSSION ON PROFITABILITY****Hypothesis**

**Ho:** The profitability parameter variable values follow the assumed distribution

**H1:** The profitability parameter variable values do not follow the assumed distribution

**Test:** Kolmogorov-Smirnov

**Significant level:** 95%

**Conclusion:** Significant at 0.000

TABLE-5: NORMALITY TEST FOR PROFITABILITY VARIABLES.

|                                   | Kolmogorov-Smirnov <sup>a</sup> |     |      |
|-----------------------------------|---------------------------------|-----|------|
|                                   | Statistic                       | df  | Sig. |
| Interest earned/ Total assets     | .312                            | 133 | .000 |
| Non interest income/ Total assets | .233                            | 133 | .000 |
| Net income/equity                 | .188                            | 133 | .000 |
| Net income/total Assets           | .194                            | 133 | .000 |

a. Lilliefors Significance Correction

Before applying the hypothesis test the data to check for normality. Hence we applied Kolmogorov-Smirnov test. According to this test all four variables showed df 133, P<0.001. It rejects the null hypothesis and accepting alternative hypothesis.



**HYPOTHESIS**

**H<sub>0</sub>:** The mean difference of profitability parameter variables do not show differences in view of Basel I norms

**H<sub>1</sub>:** The mean differences of profitability parameter variables show differences in view of Basel I norms

Test: Wilcoxon test

**Significant level:** 95%

**Conclusion:** Significant at .000 (except interest earned/total assets)

**TABLE-6: WILCOXON TEST FOR PROFITABILITY VARIABLES Test Statistics<sup>c</sup>**

|                        | Int.earned/total Assets | Non int. income/Total asst | Net income/equity    | Net income/total Assets |
|------------------------|-------------------------|----------------------------|----------------------|-------------------------|
| Z                      | -1.818 <sup>a</sup>     | -10.030 <sup>a</sup>       | -10.031 <sup>b</sup> | -10.031 <sup>b</sup>    |
| Asymp. Sig. (2-tailed) | .069                    | .000                       | .000                 | .000                    |

a. Based on positive ranks.

b. Based on negative ranks.

c. Wilcoxon Signed Ranks Test

The above Wilcoxon test which evaluated difference between mean of different variables for two different periods is significant. Interest earned/total Assets z=-5.9, p<.001, Non interest income/Total assets z= -7.84, p<.001, Net income/equity z=-5.112, p<.001, and Net income/Total assets z= -10.031, p<.001. That is, the results indicate significant differences between the two periods.

**MULTIPLE CORRELATIONS**

When we have ratio level data we use correlation to measure associations between variables. The following table measures the degree of linearity between two variables.

**OPERATIONAL VS. EFFICIENCY**

**H<sub>0</sub>:** There is no association between operating ratios and efficiency ratios

**H<sub>1</sub>:** There is an association between the operating ratios and efficiency ratios

Test: Correlation

**Confidence Level:** 99%

**Conclusion:** The null hypothesis is rejected. All the operational ratios are associated with efficiency ratios at 1% significant level.

**TABLE-7: MULTIPLE CORRELATIONS MATRIX: OPERATIONAL VS. EFFICIENCY**

|                       | Deposits/Total Assets | Advances/Total Assets | Advances/Deposits | Op.cost/Total Assets | NPA to Advances | Deposits/Employee | Advances/Employee | Net income/Employee |
|-----------------------|-----------------------|-----------------------|-------------------|----------------------|-----------------|-------------------|-------------------|---------------------|
| Deposits/Total Assets | 1.000                 | .002                  | -.096             | -.404**              | -.578**         | .544**            | .363**            | .488**              |
| Advances/Total Assets |                       | 1.000                 | .294**            | -.243**              | -.235**         | .244**            | .262**            | .222**              |
| Advances/Deposits     |                       |                       | 1.000             | -.755**              | -.606**         | .716**            | .879**            | .727**              |
| Op.cost/Total Assets  |                       |                       |                   | 1.000                | .636**          | -.953**           | -.904**           | -.957**             |
| NPA to Advances       |                       |                       |                   |                      | 1.000           | -.753**           | -.771**           | -.668**             |
| Deposits/Employee     |                       |                       |                   |                      |                 | 1.000             | .937**            | .961**              |
| Advances/Employee     |                       |                       |                   |                      |                 |                   | 1.000             | .929**              |
| Net income/Employee   |                       |                       |                   |                      |                 |                   |                   | 1.000               |

**Table 7:** Multiple correlation matrixes show the relationship between the operational and efficiency ratios of public sector banks in India. The banks' operational performances are measured by Deposits/Total assets, Advances/Total assets, Advance/Deposits and Operating cost/ Total assets. The efficiency of public sector banks is measured by non-performing assets to advances, deposits per employee, advances per employee and net income per employee. Deposits by total assets is moderately associated with non performing assets (r = -.578, p<0.001), deposits per employee (r = .544, p<0.001), advances per employee (r = .363, p<0.001) and net income per employee (r = .488, p<0.001) which is a good indication of increasing efficiency. Though the advances to total assets is associated with NPA negatively (r = -.235, p<0.001) and positively with advances per employee (r = .262, p<0.001) and net income per employee (r = .488, p<0.001), the degree of association is very low. Operating cost to total assets is very strongly associated with deposits per employee (r = -.953, p<0.001), advances per employee (-.904, p<0.001) and income per employee (-.957, p<0.001). The above associations are significant at p<0.01 indicating strong evidence to support the alternative hypothesis stating that there is strong evidence for association. As a whole, the public sector banks' efficiency has improved during the study period.

**OPERATIONAL VS. PROFITABILITY**

**H<sub>0</sub>:** There is not significant association between operating and profitability ratios

**H<sub>1</sub>:** There is a positive association between operating and profitability ratios

Test: Correlation;

**Confidence Level:** 95%

**Conclusion:** It rejects the null hypothesis.

TABLE-8 MULTIPLE CORRELATIONS MATRIX: OPERATIONAL VS. PROFITABILITY

|                         | Deposits/Total Assets | Advances/Total Assets | Advances/Deposits | Op.cost/Total Assets | Int.earned/total Assets | Non int. income/Total asst | Net income /equity | Net income/total Assets |
|-------------------------|-----------------------|-----------------------|-------------------|----------------------|-------------------------|----------------------------|--------------------|-------------------------|
| Deposits/Total Assets   | 1.000                 | .002                  | -.096             | -.404**              | -.086                   | -.270**                    | .727**             | .663**                  |
| Advances/Total Assets   |                       | 1.000                 | .294**            | -.243**              | -.108                   | -.151*                     | .068               | .123                    |
| Advances/Deposits       |                       |                       | 1.000             | -.755**              | -.334**                 | -.463**                    | .149*              | .325**                  |
| Op.cost/Total Assets    |                       |                       |                   | 1.000                | .266**                  | .634**                     | -.612**            | -.736**                 |
| Int.earned/total Assets |                       |                       |                   |                      | 1.000                   | -.531**                    | -.299**            | -.418**                 |
| Nonint income/Tot asst  |                       |                       |                   |                      |                         | 1.000                      | -.168**            | -.201**                 |
| Net income/equity       |                       |                       |                   |                      |                         |                            | 1.000              | .976**                  |
| Net income/total Assets |                       |                       |                   |                      |                         |                            |                    | 1.000                   |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

**Table 8:** Multiple correlation matrix shows association between operational performance and profitability improvements is measured by four ratios namely interest earned/total assets, non-interest income/total assets, net income/equity and net income/total assets. Deposits are the main sources for the bank to lend loans and advances to their customers in order to earn more interest income but it is negatively associated with interest income ( $r = -.086$ ,  $p > 0.005$ ) and non interest income is also moderately associated ( $r = -.270$ ,  $p < 0.001$ ) are the main concern to the public sector banks. Deposits/Total Assets is strongly related with net income to total assets ( $r = .663$ ,  $p < 0.001$ ) and net income to equity ( $r = .727$ ,  $p < 0.001$ ). The operating cost to total assets is low association with interest income to total assets ( $r = .266$ ,  $p < 0.001$ ) and moderately associated with non interest income ( $r = .634$ ,  $p < 0.001$ ). This is also a great concern to public sector banks. They depend more on non-interest income rather than interest income. This may be due to competition after entering the global economy. The above table shows in many cases the variables are significant at one percent ( $p < 0.001$ ). This means there is a strong association between operations and profitability.

#### EFFICIENCY VS. PROFITABILITY

**H0:** There is not significant association between Efficiency and Profitability

**H1:** There is significant association between Efficiency and Profitability

**Test:** Correlation;

**Confidence level:** 95%

**Conclusion:** Reject the null Hypotheses

TABLE-9: MULTIPLE CORRELATION MATRIX: OPERATIONAL VS. PROFITABILITY

|                         | NPA to Advances | Deposits/Employee | Advances/Employee | Net income/Employee | Int.earned/total Assets | Non int. income/Total assets | Net income/equity | Net income/total Assets |
|-------------------------|-----------------|-------------------|-------------------|---------------------|-------------------------|------------------------------|-------------------|-------------------------|
| NPA to Advances         | 1.000           | -.753**           | -.771**           | -.668**             | .399**                  | .348**                       | -.455**           | -.534**                 |
| Deposits/Employee       |                 | 1.000             | .937**            | .961**              | -.224**                 | -.639**                      | .643**            | .744**                  |
| Advances/Employee       |                 |                   | 1.000             | .929**              | -.292**                 | -.593**                      | .479**            | .610**                  |
| Net income/Employee     |                 |                   |                   | 1.000               | -.326**                 | -.530**                      | .732**            | .834**                  |
| Int.earned/total Assets |                 |                   |                   |                     | 1.000                   | -.531**                      | -.299**           | -.418**                 |
| Nonint income/Tot asst  |                 |                   |                   |                     |                         | 1.000                        | -.168**           | -.201**                 |
| Net income/equity       |                 |                   |                   |                     |                         |                              | 1.000             | .976**                  |
| Net income/total assets |                 |                   |                   |                     |                         |                              |                   | 1.000                   |

\*\* . Correlation is significant at 0.01 level (2-tailed).

**Table 9:** Shows the relationship between the efficiency and profitability of the public sector banks. From the above analysis, it has been found that there is significant correlation among the variables. NPA to advances shows very low association with interest income ( $r = .399$ ,  $p < 0.001$ ), non interest income ( $r = .348$ ,  $p < 0.001$ ) and moderate relation with net income to equity ( $r = -.455$ ,  $p < 0.001$ ) and net income to total assets ( $r = -.534$ ,  $p < 0.001$ ). Deposit per employee is associated at very low level with interest earned to total assets ( $r = -.224$ ,  $p < 0.001$ ), moderately with non-interest income to total assets ( $r = -.639$ ,  $p < 0.001$ ), net income/enquiry ( $r = .643$ ,  $p < 0.001$ ) and net income to total assets ( $r = -.534$ ,  $p < 0.001$ ).

#### INTERPRETING THE MULTIPLE REGRESSION

In the previous tables, we saw that it is possible for variables to have strong associations. In the forthcoming tables, we analyze how one can use data to predict relationship. The main reason that financial research is highly regarded in the financial profession is that manager's need assistant with predicting the future. After all, any manager can spend crores of rupees on operating expenditure. Imagine if you could tell a manager that if he or she spends X amount of rupees on operating cost, then the company will earn Y amount of profit, you would probably be promoted in your position. Here multiple regression is used to test the linearity between ROA and other independent variables and all so to see how for the independent variables are related with ROA. From this type of analysis one can ascertain what are the variables taking more importance to contribute to increase income and what are variables showing less importance. This will be very helpful for management decision making.

The following tables illustrate the outcomes of the multiple regressions.

TABLE 10a: MODEL SUMMARY<sup>b</sup>

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | .999 <sup>a</sup> | .997     | .997              | .01513                     | .223          |

a. Predictors: (Constant), Int.earned/total Assets, Advances/Total Assets, Net income/equity, Advances/Deposits, NPA to Advances, Op.cost/Total Assets

b. Dependent Variable: Net income/total Assets

The strength of a correlation is assessed on a scale from -1 to +1. The model summary table shows the correlation and the coefficient of determination. The correlation between ROA with net-interest income to total assets, non-performing assets to advances, net-income per employee, interest earned to total assets, advances per employee, deposits per employee and operating cost to total assets is 0.999 (**under the R**); thus, this is a very strong positive relation. This means that almost 99% of the changes in unit of ROA can be attributed to interest earned to total assets, deposits to total assets, advances to deposits, non-performing assets to advances, total income to total assets, net-income per employee are taken together.

The next column shows a value of **R square**, which is a measure of how much of the variability in the outcome, is accounted for by the predictors. Its value is 0.997, which means that all predictors accounts for 99.7% of the variation in ROA.

The **adjusted R square** gives us some idea of how well our model generalizes and ideally we would like its value to be the same, or very close to, the value of R square. In the above table shows a difference for the final model is a fair fit (0.999-0.997 = 0.002 or 0.02%). This shrinkage means that if the model were derived from the population rather than sample it would account for approximately 0.02% less variance in the outcome.

The ANOVA table indicates whether there is a linear relationship between the predictors and the dependant variable. Therefore I propose the following hypothesis:

**H<sub>0</sub>:** There is no linear relationship between ROA and the independent variables

**H<sub>1</sub>:** There is a linear relationship between the ROA and the independent variables.

**Test:** ANOVA

**Confidence level:** 95%

**Significant factor:** .000, reject the null hypothesis, stating that there is linear relationship between ROA and independent variables.

TABLE 10b: ANOVA<sup>b</sup>

| Model        | Sum of Squares | df  | Mean Square | F         | Sig.              |
|--------------|----------------|-----|-------------|-----------|-------------------|
| 1 Regression | 21.034         | 6   | 3.506       | 15308.191 | .000 <sup>a</sup> |
| Residual     | .055           | 240 | .000        |           |                   |
| Total        | 21.089         | 246 |             |           |                   |

a. Predictors: (Constant), Int.earned/total Assets, Advances/Total Assets, Net income/equity, Advances/Deposits, NPA to Advances, Operating cost/Total Assets

b. Dependent Variable: Net income/total Assets

The next part of the outcome contains an analysis of variance (ANOVA) that tests whether the model is significantly better at predicting the outcome than using the mean as a "best guess". Specifically, the F ratio represents the ratio of the improvements in prediction that results from fitting the model (labeled "Regression" in the table), relative to inaccuracy that still exists in the model (labeled "residual" in the table). If the improvement due to fitting the regression model is much greater than the inaccuracy within the model, then the value of F will be greater than 1 and SPSS calculates the exact probability of obtaining the value of F by chance. In the ANOVA table, F-ratio is 15308.191, which is very unlikely to have happened by chance ( $p < 0.001$ ). Since the ANOVA table indicates that there is linear relationship between net income to total assets and predictor variables, researcher proceeds with interpreting the model. The coefficient table provides partial coefficient for the constant, interest earned to total assets, deposits to total assets, advances to deposits, non-performing assets to advances, total income to total assets and net income per employee.

TABLE 10c: COEFFICIENTS<sup>a</sup>

| Model                   | Unstandardized Coefficients |            | Stand. Coeff. | t       | Sig. | Collinearity Statistics |       |
|-------------------------|-----------------------------|------------|---------------|---------|------|-------------------------|-------|
|                         | B                           | Std. Error |               |         |      | Tolerance               | VIF   |
| 1 (Constant)            | .439                        | .037       |               | 11.838  | .000 |                         |       |
| Op.cost/Total Assets    | -.041                       | .002       | -.168         | -20.307 | .000 | .159                    | 6.288 |
| NPA to Advances         | .019                        | .002       | .040          | 8.483   | .000 | .481                    | 2.080 |
| Net income/equity       | .044                        | .000       | .848          | 144.170 | .000 | .314                    | 3.188 |
| Advances/Total Assets   | 4.132E-5                    | .000       | .005          | 1.349   | .179 | .908                    | 1.102 |
| Advances/Deposits       | .002                        | .000       | .057          | 7.751   | .000 | .204                    | 4.913 |
| Int.earned/total Assets | -.037                       | .001       | -.116         | -30.143 | .000 | .731                    | 1.369 |

a. Dependent Variable: Net income/total Assets

The coefficient of Operating cost/Total Assets is -0.041, NPA to Advances is 0.019, net income to equity is 0.044, advances/total assets is 4.132E-5, advances/deposits is 0.002, and interest earned/total assets is -0.037. Before you can place it into a linear equation, you must check its corresponding t value and significant level. For a variable to be valid, the significance level must be between .00 and .0499. We can test the following hypothesis:

**H<sub>0</sub>:** The coefficient of all independent variables is equal to zero

**H<sub>a</sub>:** The coefficient of all independent variables is not equal to zero

**Test:** T-test

**Confidence level:** 95%

**Significance factor:** .000 (all independent variables except advances/total assets) accept the null hypothesis.

**The new equation is then:**

ROA = .439 – .041 (operating cost/total assets) + .019(NPA to advances) + .044(Net income/equity) + 4.132E-5(advances/total assets) + .002(advances/deposits) - .037 (interest earned to total assets)

From the Table10c, it is very clear that the slope of NPA/advances, net income/equity, advances/total assets, advances/deposits is positive, thus we have an upward line, indicating that when all these variables increase, the ROA will also increase. The slope of operating cost/total assets and interest earned/total assets is negative, thus we have a downward line indicating that when the average operating cost/total assets and interest earned/total assets decreases, the ROA increases. Note also the value in the column headed **standardized co efficient or beta**. This beta value is a measure of the strength of each predictor variable.

VIF stands for Variation Inflation Factor. "VIF" number is a measure of **Collinearity statistics**. A rule-of-thumb is that the number should be less than 10 or 0.10 in Tolerance value. If it is greater than 10, that means your independent variables are highly correlated with one another. As a result, we should remove the variables with the large VIF from the analysis and perform new regression. Thus when all the variables are included in the regression, the variables like deposits/total assets, deposits/employee, advances/employee, net income/employee and non-interest income/total assets showed strong relationship with other independent variables resulting in multicollinearity (VIF is more than 10 and the tolerance value is less than 0.1); therefore all these variables are excluded in the regression.

## FINDINGS

1. The variables are not normally distributed when scanned with normality test, Kolmogorov test. Therefore non-parametric test (Wilcoxon test) has been used to test the hypothesis.
2. Four variables (Deposits/Total assets, Advances/Total assets, Advances/Deposits, Operating cost/ total assets) included in the operating performance of the public sector banks showed very strong evidence for improvement of operating performance in view of Basel I norms.
3. All the four variables included in the efficiency parameter showed strong evidence for improvement in view of Basel I norms.
4. Out of the four variables, three variables alone showed strong evidence for improvement in profitability in view of Basel I norms.
5. There is strong evidence that the performance of the public sector banks is associated with efficiency
6. All the operational variables are negatively associated with interest income and non-interest income but positively related with income to total assets. From this observation, it is clear that higher ROA is not because of increased interest income but because of decreased operating cost.
7. The three variables considered to test the employee efficiency show negative association with interest income and non-interest income but positive relation with ROA and income/equity.
8. Operating cost/total assets, NPA to advances, Net income/equity, advances/total assets, advances/deposits, interest earned to total assets is good predictors of ROA

## CONCLUSION

Three parameters namely operational, efficiency and profitability are taken in the study in order to see the overall performance between the two periods, association between parameters for the whole period and how the predictors predict the dependent variable. In each and every parameter four ratio level data are taken to assess the effectiveness of the public sector banks.

All the four variables considered under the head 'operational performance' show significant improvement between the periods. Three of the four variables namely deposits/total assets, advances/total assets and advances/deposits have increased after period 1. Operating cost/total assets has decreased from period 1 to period 2. This clearly indicates that the operating performance has improved in the second period.

Among the four variables studied under the head 'efficiency' the NPA/advances has reduced in period 2. This is because of the implementation of Basel I Policy in April 1993 regarding supervisory treatment of market risk and interest rate risk. Deposits/employee, advances/employee and net income/employee had increased in the second half. The increased efficiency is directional proportional to the operations.

Third, scrutiny of the profitability condition shows moderate improvement due to better operation and efficiency. The main source of income to the public sector bank is interest income. But it is negatively related, though not significant, to the net income. This is not a good prognosis for the public sector banks. This negative relationship may be due to increased competition and resulting fall in spread. On the other hand, non-interest income has showed a hike during the second period.

From the above one may imply that the bankers are concentrating on the non-interest income when the interest income has reduced. Though the interest income does not show any improvement, income/equity, and income/total assets show significant changes. This is because of lower operating costs. As a whole, taking 12 variables in the study period, 11 variables have shown highly significant changes over the two periods. If this trend continues in future, the public sector banks would acquire a position stable enough to challenge the Basel II Norms. In multiple regression, operating costs are related with income negatively at high significance. This is a good sign of good performance of the public sector banks. The outcome of the analysis shows consistency in the entire statistical test used in the study.

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