

IMPACT OF BANK SPECIFIC DETERMINANTS ON NET INTEREST MARGIN: EMPIRICAL EVIDENCE FROM PUBLIC AND PRIVATE SECTOR COMMERCIAL BANKS IN INDIA

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Abstract

This empirical study critically examines the linkage between net interest margin of 43 public and private sector banks and bank specific determinants for the period 2002-2003 to 2013-2014. The study aims to find the association between Net Interest Margin (NIM) and bank specific determinants with the help of statistical tools such as descriptive statistics, multiple correlation analysis and multiple regression analysis. The analytical results confirmed the statistically significant relationship between net interest margin of public and private sector banks and bank specific factors such as return on investment, operating profits to total assets, provisions and contingences to total assets and burden to total assets ratios

Keywords:

Net Interest Margin to Total Assets, Public and Private Sector Commercial Banks, Return on Investment, Multiple Regression Analysis

1. INTRODUCTION

Net interest margin (NIM) is a one of the three profitability measures which implies the difference between the interest earned by commercial banks and the amount of interest expended to their lenders (for instance, various deposit holders), in proportion to the amount of their interest-earning deposits. Net Interest Margin is the key indicator of financial health of commercial banks as it explains the performance of commercial banks in terms of their core business activities. This ratio should not be at a lower level at the same time, it should not be so high. Deposit costs and interest rate are closely associated with the net interest margin of commercial banks. Apart from this, there are various factors such as operating efficiency ratio, gross non-performing assets ratio and RBI policy rates which may impact the net interest margin. In this study, bank specific determinants are considered for the analysis of net interest margin of 43 scheduled public and private sector commercial banks. With this few introductory note, the study is organised into following sections. Section 2 deals with review of literature, Section 3 explain the research design, Section 4 presents the summary of empirical results, findings and suggestions and section 5 concludes.

2. REVIEW OF LITERATURE

Jesús Gustavo Garza-García (2010) [1] identified the major determinants of net interest margins for a set of developed and developing countries using GMM dynamic panel data regression

and Lerner index. The analytical results revealed that operating costs, capital adequacy, interest rate risk, the size of banks, the inflation rate, economic growth and the level of tax are the major factors influencing net interest rate margins of developed countries. Similarly explanatory variables such as capital adequacy, credit risk, implicit interest payments, cost of holding reserves, the efficiency level and the level of taxes are the major factors affecting the net interest rate margin of developing countries. It is found from the results that implicit interest payments alongside the level of tax are the most appropriate variables in determining higher interest rate margins in developing countries. It is also observed from the analysis that operating expenses is the most significant variable causing increase in net interest rate margins of commercial banks in developed and developing countries. Arvid Raknerud et al. (2011) [2] studied the impact of banks' funding costs on retail rates using a dynamic factor model and a detailed panel data set based on quarterly accounts data of Norwegian banks. The estimation of the model showed clearly that a unit increase in NIBOR led to 0.8 increases in bank rates. On the other hand, the difference between banks' loan and deposit rates is independent of NIBOR. The results indicated that there exists a significant positive relation between the indicative credit spread of uncovered bonds issued by banks and loan rates specifically for business loans. Tushar B. Dhas (2013) [3] analyzed the impact of the financial crisis on the Net Interest Margin of commercial banks in India using bank-wise panel data for the period 1992 to 2010. The results indicated that the public sector banks were significantly affected due the ripple effect of financial crisis. It is found that, banks with low capital and poor liquidity were severely affected during the second half of the crisis. It is also observed from the analysis that predictor variables such as size, NPA, cost efficiency, capital cushion, deposit concentration and economic growth are the major determinants of commercial banks' interest net margin. Mirna Dumicic and Tomislav Ridzak (2013) [4] examined the major determinants of net interest margin of Central and Eastern European (CEE) countries banks for the period 1999 to 2010. It is found that lowering banks' margins were mainly due to higher efficiency. It is found from the results that different factors accounted for decline in net interest margins in CEE during the pre-crisis period. Prior to 2008, the net interest margins decreased mainly due to robust capital inflows, stable macroeconomic environment and a decline in the proportion of nonperforming loans in the balance sheets of the banks. During the crisis period, steep increase in government debt and the related increase in macroeconomic risks together with decreasing capital inflows contributed for the fluctuations in net interest margin. It is also observed from the study that the banks which were not able to

reduce their costs were prone to lose their competitive position and subsequently market share. Nadica Iloska Sahara Global Macedonia (2014) [5] examined the bank specific determinants of the net-interest margin of Macedonian banks using the multiple regression analysis based on bank level data for the period 2008 to 2011. It is found from the results that staff salary expenses and investments in loans contributed positively for high net-interest margin. It is observed that management’s behaviour towards risk, the size of the bank and expenses management did not show any significant impact on bank profitability. Loan-to-asset ratio had a positive and significant relationship, implying that loans are much better investment for Macedonian banks than any other asset. Pamuji Gesang Raharjo et al. (2014) [6] identified the bank specific and banking sectoral specific factors affecting commercial banks’ net interest margin in Indonesia using fixed effects panel data regression model for the period 2008-2012. It is found from the results that net interest margin of Indonesian commercial banks are affected by all the bank specific variables whereas inflation is the only external factor that affected on interest margins.

Thus, the present study has identified the 2 gaps in the existing literature reviewed and removed those gaps by including all the scheduled commercial banks taken based on ownership pattern and considering the vast study period

3. RESEARCH DESIGN

3.1 RESEARCH OBJECTIVES

- To delineate the relationship between Net Interest Margin to Total Assets and bank specific determinants such as Investment Deposit Ratio, Logarithm of Interest Income, Return on Investment, Operating Expenses to Total Assets, Operating Profit to Total Assets, Return on Investment and Gross Non-Performing Assets of public and private sector commercial banks in India.
- To identify the impact of bank specific determinants on net interest margin public and private sector commercial banks in India in the context of expected relationship.

3.2 STATEMENT OF HYPOTHESES

H₀: There is no significant relationship between Net Interest Margin of public and private sector commercial banks and banks specific determinants.

H_a : There is a significant relationship between Net Interest Margin of public and private sector commercial banks and banks specific determinants.

3.3 RESEARCH METHODOLOGY

For the purpose of analysis, all the public and private sector commercial banks have been taken depending on the availability and consistency of data. The analysis primarily depends on secondary data. The required data have been taken from Trend and Progress of Banking in India published by Reserve Bank of India. The Selected Ratios of Scheduled Commercial Banks reported in Statistical Tables Relating to Banks in India have been used for the present study. The study covers a period of 12 years starting from 2001-2003 to 2012-2014.

The following statistical tools are employed in this study in order to compare the relationship between dependent and independent variables and analyse how independent variables influence the dependent variable.

- Descriptive Statistics
- Multiple Correlation and
- Multiple Regression Analysis

3.3.1 Multiple Regression Model:

The empirical model for all the banks has been framed having considered the multi collinearity. The bank specific net interest margin variables are fitted into multiple regression equation as follows:

$$NIMTA = \alpha + \beta_1 IDR + \beta_2 LII + \beta_3 ROI + \beta_4 OETA + \beta_5 OPTA + \beta_6 PCTA + \beta_7 BTA + \beta_8 GNPA + \zeta$$

where, α = Constant, β_1, \dots, β_8 = Estimated coefficients, ζ = error term.

Table.1. Summary of Relationship between Dependent and Independent Variables

Dependent Variable	Independent Variables	Expected Relationship
NIMTA - Net Interest Margin to Total Assets	IDR – Investment to Deposit Ratio	+
	LII – Logarithm of Interest Income	+
	ROI – Return on Investment	+
	OETA – Operating Expenses to Total Assets	-
	OPTA – Operating Profit to Total Assets	+
	PCTA – Provisions and Contingencies to Total Assets	-
	BTA – Burden to Total Assets	+/-
	GNPA – Gross Non-Performing Assets Ratio	-

4. RESULTS AND DISCUSSION

The Table.2 presents the descriptive statistics 43 scheduled commercial banks operating in the Indian Banking sector during the period from 2003-2014. The summary statistics delineates a wide variability among the bank specific factors which have effect on scheduled commercial banks’ net interest margin. The Investments to Deposits ratio (IDR) variable has the highest mean value followed by Logarithm of Interest Income (LII) and Return on Investment (ROI). The mean of IDR is 36.8404 and standard deviation is 8.62960, which show that the IDR deviates to the extent of 8.62960 from both the ends. From Table.1, it can be seen that GNPA (Gross Non-Performing Assets Ratio) has the highest standard deviation which implies that GNPA has more

significance in terms of variability than any other variables in the study over the study period. It also shows the highest disparity between its minimum and maximum values which are 0.38% and 19.88% respectively. To study the net interest margin, Net Interest Margin to Total Assets (NIMTA) has been taken as dependent variable. Net Interest Margin is one of the profitability indicators used to measure the financial health of the commercial banks. The average value of Net Interest Margin is 2.6094 and its minimum and maximum value ranges from -1.40 to 4.24.

Table.2. Descriptive Statistics Analysis of NIM Determinants in Public and Private Sector Commercial Banks

Variables	Minimum	Maximum	Mean	Std. Deviation
NIMTA	-1.40	4.24	2.6094	.61604
IDR	20.41	73.62	36.8404	8.62960
LII	4.17	12.81	8.4108	1.63457
ROI	4.42	23.35	7.2193	1.49090
OETA	.04	15.46	2.0813	1.37948
OPTA	-.67	6.68	1.9636	.81334
PCTA	-.04	10.60	1.0249	.68761
BTA	-11.69	14.55	.8282	1.59551
GNPA	.38	19.88	5.1979	11.23617

Table.3. Multiple Correlation Analysis of Net Interest Margin Determinants in Public and Private Sector Commercial Banks

	IDR	LII	ROI	OETA	OPTA	PCTA	BTA	GNPA
IDR	1							
LII	.002	1						
ROI	.294**	-	1					
OETA	.117**	-.083	.071	1				
OPTA	.320**	-.051	.311**	.013	1			
PCTA	.361**	.089*	.223**	-.056	.248**	1		
BTA	-	-	-.016	.742**	-.145**	-	1	
GNPA	.095*	-	.126**	.020	.050	.083	.007	1

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

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

The Table.3 shows correlation among independent variables of net interest margin of public and private sector commercial banks, the quantum as well as the direction of relationship between any two variables. Multiple regressions were run in SPSS 16 using the Enter Method to test the set hypotheses or more clearly to test how the independent variables explain the net interest margin of sample banks. Before running the regression, investigation into the multicollinearity problem was carried out using the Pearson Correlation method. First of all, bivariate (pair-wise) correlations among the independent variables were examined to find out the multicollinearity problem. The existence of correlation of about 0.80 or larger indicates that there is problem of multicollinearity (Lewis-Back 1993). None of the pair-wise coefficient of correlation is 0.80 or larger. Burden to

Total Assets (BTA) and Operating Expenses to Total Assets (OETA) ratio are the highly correlated variables among all other explanatory variables. Though Burden to total assets (BTA) ratio is having a low correlation value, it is negatively correlated with investments to deposits ratio (IDR). Natural logarithm of interest income (LII) and Gross Non-Performing Assets (GNPA) are also having weaker correlation with IDR. All the other variables such as Return on Investment (ROI), operating profits to total assets ratio (OPTA) and provisions and contingencies to total assets (PCTA), are having positive and moderate correlation with investments to deposits ratio (IDR).

4.1 MULTIPLE REGRESSION ANALYSIS OF NET INTEREST MARGIN DETERMINANTS IN PUBLIC AND PRIVATE SECTOR COMMERCIAL BANKS

Multiple regression analysis helps to understand the influence of set of independent variables on the dependent variable. It is an appropriate statistical tool to find out the impact of chosen regressors or study variables. It consists of various analyses such as model summary, ANOVA and Regression Co-efficient. Model summary describes the extent of relationship between dependent and independent variables whereas ANOVA indicates the significant relationship between dependent and independent variables. Regression coefficient summary describes impact of each independent variable on dependent variable.

Table.4. Model Summary of Regression Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
SBI & Associates Banks	.993	.986	.984	.06281
Nationalised Banks	.790	.625	.611	.31758
Old Private Sector Banks	.798	.637	.618	.36555
New Private Sector Banks	.932	.869	.849	.39202

The Table.4 shows the model summary which explains the overall relationship between criterion and predictors variables. Based on these predictors, regression model has been developed for commercial banks. The model for the banks' specific determinants has been selected on the basis of high diagnostics for multicollinearity and high value for the R-Squared. The value for the R-Squared in SBI Group is 0.986 which endorses that 98.6% of the variation in the dependent variable is explained by the chosen regressors. The 1.4% variation in the dependent variable remains unexplained by the independent variables of the study. The adjusted explanation of the model is about 0.984 which implies the goodness of the fit of the model. All other banks model summary also suggests the model fit appropriate for the analysis as R square and adjusted R square values are more than 60%. Therefore, it is very clear that net interest margin of commercial banks is largely influenced by the chosen independent variables.

To assess the significance of the net interest margin models, ANOVA values have been computed for all the four category of commercial banks. The null hypothesis has been framed that the

impact of selected predictors on the net interest margin of scheduled commercial banks is nil. The ANOVA results in the Table.5 exhibit that the chosen regressors have been statistically significant in explaining the variation in net interest margin of public and private commercial banks.

Hence, the null hypothesis expressing no impact of selected predictors on the net interest margin stands rejected. Thus, it can be clearly inferred that the variation caused by independent variables such as investment to deposit ratio, logarithm of interest income, return on investment, operating expenses to total assets, operating profits to total assets, provisions and contingencies to total assets, burden to total assets and gross non-performing assets have significant impact on net interest margin of public and private commercial banks.

Table.5. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
SBI & Associates Banks	Regression	17.646	8	2.206	559.07	.000
	Residual	.249	63	.004		
	Total	17.894	71			
Nationalised Banks	Regression	36.774	8	4.597	45.58	.000
	Residual	22.087	219	.101		
	Total	58.861	227			
Old Private Sector Banks	Regression	34.539	8	4.317	32.31	.000
	Residual	19.643	147	.134		
	Total	54.181	155			
New Private Sector Banks	Regression	52.096	8	6.512	42.37	.000
	Residual	7.838	51	.154		
	Total	59.934	59			

Table.6. Summary of Regression Coefficients of Net Interest Margin Determinants in Public and Private Sector Commercial Banks

Variables	SBI & Associates Banks		Nationalised Banks		Old Private Sector Banks		New Private Sector Banks	
	Beta	P-Value	Beta	P-Value	Beta	P-Value	Beta	P-Value
(Constant)		.000		.000		.000		.742
IDR	.056	.096	.109	.126	-.080	.157	.204	.004
LII	-.109	.010	-.164	.005	-.019	.762	-.023	.770
ROI	-.077	.003	.192	.000	.207	.003	-.032	.631
OETA	.077	.061	-.057	.345	-.299	.000	.089	.451
OPTA	1.286	.000	.502	.000	.402	.000	.309	.004
PCTA	-.076	.096	.091	.233	.494	.000	1.381	.000
BTA	.811	.000	.093	.027	.682	.000	1.600	.000
GNPA	-.081	.003	-.021	.655	.028	.591	-.556	.000

The Table.6 reports the estimated results of the regression model. Correlation coefficients and collinearity statistics tests are used to detect the multicollinearity problem. In multiple correlations, collinearity is a problem when the relationship between any two independent variables is showing a correlation coefficient of 0.80 or more. In the same way, multicollinearity is assumed to exist in regression coefficients of the model, when the variance inflation factor reveals a VIF value of 10 or more than 10 or the tolerance limit of 1 or more. The value of VIF in the collinearity statistics shows the absence of multicollinearity problem in the model. After checking up the multicollinearity problem and nonexistence of multicollinearity, the regression was run with Net Interest Margin to Total Assets (NIMTA) as dependent variable and Investment to Deposits Ratio (IDR), Logarithm of Interest Income (LII), Return on Investment (ROI), Operating Expenses to Total Assets (OETA), Operating Profits to Total Assets (OPTA), Provisions and Contingencies to Total Assets (PCTA), Burden to Total Assets (BTA) and Gross Non-Performing Assets (GNPA) as independent variables. The significant value of F (.000<.05) proves that the relationship between the Net Interest Margin and bank specific determinants are linear. The coefficient of investments to deposits ratio (IDR) is positive in all the sectors expect in old private sector banks where it shows a negative relationship with net interest margin to total assets (NIMTA). It denotes a statistically significant relationship in SBI & Associates Banks and New Private Sector Banks. It reflects that IDR of the banks increases profitability of these banks. The regression coefficient of Logarithm of interest income explains a negative relationship for all the sample banks which contradicts our expected relationship. However, it is having statistically significant relationship at 5% level with net interest margin of public sector banks only. This result implies that interest income is one of the important determinants of banks net interest margin. In line with the expected relationship, the coefficient for return on investment is having a positive and significant relationship with NIMTA of Nationalized Banks & Old Private Sector Banks. The return on investment is having a negative association with NIMTA of SBI & Associates Banks and New Private Sector Banks. But, it is having an insignificant association with NIMTA of New Private Sector Banks. Turning to another explanatory variable, it is found that the coefficient of operating expenses to total assets (OETA) is positively correlated with NIMTA of SBI & Associates Banks and New Private Sector Banks and at the same time this variable affects the net interest margin of Nationalized Banks & Old Private Sector Banks adversely. In accordance with the expected relationship the coefficient of operating profits to total assets (OPTA) is positive and significantly associated with NIMTA of all commercial banks at 1% level of significance. It is indicating the ability of operating profits to the positive contribution of profitability indicator. The regression coefficient of provisions and contingencies to total assets ratio (PCTA) is negatively correlated with NIMTA of SBI & Associates Banks only. In all other sector, it explains a positive relationship in contrast with the expected relationship. In tune with the expected relationship, the regression coefficient of Burden to total assets (BTA) is statistically significant at 1% level but positively correlated with NIMTA of all commercial banks. It implies that the impact of non-interest expenditure is minimal in commercial banks. The regression result of Gross non-performing assets ratio (GNPA) reveals a negative relationship with NIMTA

of all banks except old private sector banks. It confirms the assumption that NPA reduces the banks' profitability.

4.2 SUMMARY OF FINDINGS

This study has found out the following findings based on the empirical analysis.

- It is observed from the descriptive statistics analysis revealed that GNPA has more significance in terms of variability as it shows high standard deviation.
- It is found from the model summary of multiple regression models that all the chosen predictor variables denote the goodness of the fit of the model. These models are having high explanatory power as their R square values are high in all the category of commercial banks.
- For SBI & Associates Banks, logarithm of interest income, return on investment, operating profit to total assets, burden to total assets and gross non-performing assets are having strong relationship with net interest margin based on p-values.
- For Nationalised Banks, explanatory variables such as logarithm of interest income, return on investment, operating profit to total assets and burden to total assets are the most appropriate determinants.
- For Old Private Sector Banks, return on investment, operating expenses to total assets, operating profit to total assets, provisions and contingencies to total assets and burden to total assets are strongly associated with net interest margin.
- For New Private Sector Banks, operating profit to total assets, provisions and contingencies to total assets, burden to total assets and gross non-performing assets are the most appropriate predictors for the model.
- In all the category of sample banks, logarithm of interest income is having a negative impact on net interest margin. The close observation revealed that SBI & Associates Banks and New Private sector Banks are functioning similarly. Likewise, Nationalised Banks and Old Private sector Banks are operating in a same way.

4.3 SUGGESTIONS

The researchers have proposed the following suggestions based on the analytical results.

- GNPA of public and private sector commercial banks have negative impact on profitability measure i.e., Net Interest Margin and their interest income is not adequate to increase the profitability. So, public and private sector commercial banks could increase their interest income and gross non-performing assets.

- Return on investment ratio is also having a negative influence on net interest margin of sample banks. It is further suggested that the public and private sector commercial banks could increase their investment and diversify their investments from Government securities to new innovative financial products which reduces the risk exposure and offers lucrative returns.

5. CONCLUSION

This study empirically analysed the relationship between bank specific determinants and net interest margin of 43 public and private sector commercial banks for the period 2003-2014 using multiple regression analysis. The empirical results of multiple regression analysis revealed that bank specific determinants such as return on investment, operating profits to total assets, provisions and contingencies to total assets and burden to total assets ratios are highly determining net interest margin of public and private sector commercial banks. It could be clearly observed from the multiple regression models that SBI & Associates Banks and New Private Sector Banks function in the same style whereas Nationalised Banks and Old Private Banks functions are similar to each other.

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