

What Influences ROA of the Bank Nifty?

Rajveer S. Rawlin,

Ramaiah Institute of Management, Bangalore, India.

Ramaswamy Shanmugam,

PSG Institute of Management, PSG College of Technology, Peelamedu,

&

Poojtha Elango,

Ramaiah Institute of Management, Bangalore, India

Abstract: Indian banking stocks have been rising off of late. This is despite lingering asset quality issues that have plagued the banking sector over the past five years following a sluggish economy and a weakening Rupee. The bank nifty index is a key index comprising of the largest bank stocks in India. It would prove useful to understand the key drivers of profitability of the components of this index which would throw light on the profitability of the banking sector at large. This paper studied the influence of key internal determinants on the profitability of bank nifty components over a ten-year period from 2009-2018. The profitability measure chosen was the Return on Assets. The internal determinants chosen for the study comprised of the logarithm of bank size as measured by stock market capitalization, a key lending measure the deposit/credit ratio, income measures that include interest income/average working funds and non-interest income/average working funds, a key productivity measure in business per employee, a key asset quality measure the %Net NPA and a measure of capital adequacy the capital adequacy ratio. Asset quality, capital adequacy, income measures and bank size proved to be the important drivers of profitability of bank nifty components. Stakeholders of banks should focus on these determinants as they seek to understand the rapidly evolving Indian banking landscape.

Keywords: Bank Profitability, Determinants, Indian Banking Sector, Market capitalization, NPA, Capital Adequacy

Introduction:

Banking stocks have been correcting off late. This is despite severely deteriorating asset quality in the Indian banking landscape. The deteriorating asset quality coupled with the implementation of Basel III norms by the Reserve Bank of India (RBI) has continued to keep bank margins under pressure. Given that the banking sector often serves as the back bone of the economy it would be useful to ascertain the

drivers of profitability of this sector. This paper looks at the drivers of profitability of the bank nifty index which consists of India's largest public and private sector banks.

There are several factors that impact the profitability of banks (Sufian and Habibullah, (2010); Dietrich and Wanzenried, (2011)). These factors can be broadly classified as either internal determinants that originate within the firm such as bank size, capital, risk management, expenses management, and diversification (Molyneux and Thornton, (1992); Goddard et al., (2004); Bodla and Verma, (2006)) or external determinants that are outside the firm like market concentration, industry size and ownership, inflation, interest rates, money supply and Gross Domestic Product (GDP) (Athanasoglou et al., (2008); Chirwa, (2003)).

In the current study we focus primarily on the relationship of a selected group of internal determinants with the profitability of India's largest listed banks that constitute the bank nifty index. The profitability measured by the return of assets (ROA). The internal factors chosen include key bank metrics, income measures, and productivity measures, measures of capital adequacy, asset quality and lending efficiency. The study covered the ten-year period from the financial years ending March 2009 to March 2018.

Literature Review:

Sufian, (2009) examined the determinants of Malaysian domestic and foreign commercial bank profitability during the period 2000-2004. The independent bank specific variables used in the study were total loans divided by total assets, logarithm of total assets, loans loss provisions divided by total loans, non-interest income divided by total assets, total overhead expenses divided by total assets, and book value of stockholder's equity. The profitability measure ROA served as the dependent variable.

It was found that Malaysian banks with higher credit risk and loan concentration exhibit lower profitability levels. Additionally, banks that have a higher level of capitalization, higher proportion of income from noninterest sources, and high operational expenses proved to be relatively more profitable.

Goddard et al., (2004) studied a sample of 583 commercial, savings, and co-operative banks from five major European Union countries during the mid-1990s. Here the vector auto regression (VAR) model was used to study the relationship between the return on equity, logarithmic size and logarithmic growth of the banks. They found that banks that maintain a high capital-assets ratio grew at a modest rate, with their growth found to be linked to macroeconomic conditions. They also found a positive relationship between concentration and bank profitability.

Chronopoulos et al., (2013) studied a sample of US banks from 1984 to 2010. Here bank profitability as determined by the Return on Assets (ROA) is modeled as a function of regulatory factors, industry and economy wide factors and bank specific factors. They found size, diversification, liquidity, credit risk and asset growth significantly influenced bank profitability. Profits are found to be cyclical in nature, tending to increase during phases of economic growth and falling during periods of slow growth. The great recession of 2008 was found to increase the persistence of bank profitability following regulations directed at stabilizing the banking system.

Zarrouk et al., (2016) compared Islamic banking to conventional banking in the Middle East and North Africa (MENA) region. A sample of 51 Islamic banks was chosen for the study covering a period from 1994 to 2012. Here ROA, ROE and net profit margin served as the dependent variables. The independent variables chosen include bank specific variables such as the loans to total assets, loan loss provision to net interest revenue, loan-loss- reserves-to-gross-loans, tier 1 capital ratio, asset utilization and income expense ratio, equity to total assets, equity to debt ratio, cost to income ratio, book value per share, earnings per share and the total liabilities to total assets ratio.

Other independent variables chosen were macro-economic variables such as the GDP per capita and investment and the annual inflation rate. The study found that Islamic bank profitability is positively affected by banks' cost-effectiveness, asset quality and level of capitalization. The inflation rate negatively impacted Islamic bank profitability. Overall the profitability determinants did not differ significantly for Islamic and conventional banks.

Growe et al., (2014) studied the profitability and performance measurement of U.S. regional banks during the period from 1994 to 2011. They found that the efficiency ratio and provisions for credit losses negatively impact profitability while equity scaled by assets positively impacts profitability. Additionally, the level of nonperforming assets negatively influences profitability while macroeconomic variables did not influence profitability.

Massod and Ashraf, (2012) looked at the effect of bank specific variables such as asset size, capital adequacy, asset quality, liquidity, operating efficiency and financial risk and macroeconomic determinants such as the annual real gross domestic growth rate and the annual inflation rate on profitability as measured by the return on assets (ROA) and return on equity (ROE) of banks in 12 Islamic countries with a fixed effects panel data model.

Their study found that banks with larger asset sizes were highly profitable. Capital adequacy and the loans to assets also positively influenced profitability. Gearing was positively correlated to ROA but negatively correlated to ROE suggesting that financial risk at Islamic banks influenced ROA positively but impacted ROE negatively.

Liu and Wilson, (2010) examined the role of key determinants on the profitability of Japanese banks over the period 2000 to 2007. The measures of profitability chosen were: ROA, ROE and net interest margin (NIM). The independent variables that were chosen included bank specific and macroeconomic determinants.

The bank specific determinants chosen were: noninterest income to total operating income ratio, the loans to assets ratio, the capital to assets ratio, the cost to income ratio, the ratio of impaired loan to gross loans granted and market share. The macro economic variables chosen were the sum of the squares of each bank's market shares, the real GDP growth of Japan and the stock market capitalization relative to GDP.

Their study found that well capitalized, efficient banks, with lower credit risks tended to outperform their less capitalized, less efficient counterparts having higher credit risks. Additionally, concentration, Gross Domestic Product (GDP) growth and the extent of stock market development played an important role in determining the profitability of Japanese banks.

Tan and Floros, (2012) examined the determinants of profitability of Chinese banks. Over 100 Chinese banks were studied from 2003 to 2009. The measures of profitability used as dependent variables were: the return on assets and net interest margin. The independent variables included bank specific, industry specific and macroeconomic variables.

Bank specific variables chosen were: the log of total assets, loan loss provisions to total loans, loans to assets, tax to operating profit before tax, shareholder's equity to total assets, overhead expenses to total assets, noninterest income to gross revenues and gross revenue to number of employees. Industry specific variables included bank assets to assets of banking industry, bank assets to GDP and market capitalization of listed companies to GDP. The annual inflation rate was the macroeconomic variable chosen.

Their study found a positive relationship between bank profitability and cost efficiency, banking sector development, stock market development and inflation in China. The authors suggested that low profitability can be explained by higher volumes of non-traditional activity and higher taxation. The authors further suggested that Chinese banks must increase their productivity to boost their profitability. They also suggested that the government should gradually continue

to open up the banking sector, as the development of the financial sector would help in increasing bank profits.

Research Methodology:

This study used historical data of India's largest public and private sector banks that constitute the bank nifty index to study the relationship between key determinants of profitability and important profitability measures. The sample consists of 4 Public sector banks and 7 private sector banks which are constituents of the bank nifty index, that have been listed for a period of at least 5 years. These were studied over a 10 period between the financial years ending March 2009 and March 2018. The following variables have been considered for the study:

Independent Variables:

Key Stock Markets Metrics:

- The logarithm of Bank size (S) as measured by stock market capitalization

Key lending measure:

- The credit deposit ratio (CDR).

Income Measures:

- Interest income to average working funds (IIAWF)
- Noninterest income/average working funds (NIIAWF)

Productivity measure:

- Business per employee (BPE).

Measure of Capital Adequacy:

- The capital adequacy ratio (CAR).

Measure of Asset Quality:

- The logarithm of the percentage net non-performing assets (NNPA).

Dependent Variable:

Bank Profitability as measured by the Return on Assets (ROA)

The study was conducted with annual data for the ten-year period spanning from the financial years ending March 2009 to March 2018. Historical data on all of the above were obtained from the Capitaline financial database and the Reserve Bank of India data base on the Indian economy. The relationship between the variables was analyzed with the GRETL econometrics package. Descriptive statistics that includes mean, median and standard deviation was performed on all variables. Q-Q plots and normality tests were used to ascertain normality of the data. Variables

that did not fit a normal distribution were normalized by taking their logarithms.

Correlation analysis was used to study the relationship between the respective variables. P-values were used to assess the statistical significance of the correlations observed at 95% confidence intervals. Then quantile regression analysis was used to study the impact of all the independent variables taken individually and together on the profitability as measured by ROA of the respective banks.

The Breusch Pagan test was used to detect heteroscedasticity in the data. Given the presence of heteroscedasticity a robust estimation was performed using the quantile regression technique to estimate the relationship between the variables. The Akaike Criterion (AIC) was used to validate the model fit. Variance Inflation Factor (VIF) was used to detect multi-collinearity in the data. The normality of the residuals was also checked.

Results:

This research study attempted to examine the determinants of ROA of India's listed public and private sector banks that constitute the bank nifty index. Some key metrics of these banks are listed below (Table 1).

Bank	Market Capitalization	Net Profit	Net Interest Income	Total Assets
HDFC Bank	654,208	21,078	98,972	1,244,541
State Bank of India	324,499	862	242,869	3,680,914
Kotak Mahindra Bank	283,296	4,865	23,943	312,172
ICICI Bank	275,571	3,363	63,401	879,189
Axis Bank	197,990	4,677	54,986	800,997
IndusInd Bank	91,049	3,301	22,261	221,626
Yes Bank	21,844	1,720	29,625	312,446
Bank of Baroda	48,450	434	49,974	780,987
Punjab National Bank	34,715	-9,976	51,310	774,950
Federal Bank	21,101	1,244	11,419	159,340
Canara Bank	21,422	347	46,810	694,767

Source: Moneyontrol.com, As on: 13.07.2019, Values in 10 Million Rupees.

Descriptive statistics of the variables is summarized below. Normality tests were conducted to determine if the variables fit normal distributions. Variables that didn't fit normal distributions were normalized by taking their respective logarithms (Table 2).

Table 2: Summary Statistics of Variables			
Variable	Mean	Median	Standard Deviation
Return on Assets	1.1865	1.3500	0.6879
Log (Bank Size)	10.593	10.527	1.2061
Capital Adequacy Ratio	15.17	15.22	2.3889
Business per Employee	11.283	10.765	3.9780
Credit Deposit Ratio	80.654	77.665	9.9141
Log (Percentage Net Non-Performing Assets)	-0.1574	-0.1230	1.2579
Interest Income to Average Working Funds	8.5485	8.7200	1.1950
Noninterest Income to Average Working Funds	1.5647	1.5200	0.52738

Correlation analysis showed that ROA had a slight positive relationship with the logarithm of bank size and the credit deposit ratio and a strong positive relationship with the capital adequacy ratio, interest income to average working funds and noninterest income to average working funds. ROA also showed a weak relationship with business per employees and a strong negative relationship with the logarithm of net non-performing assets. The correlations observed were statistically significant at the 95% confidence level (Table 3).

Table 3: Correlation Analysis

Dependent Variable (Profitability)	Independent Variable (Determinant)	Correlation Coefficient (R)	Relationship	P Value (95% Confidence)
ROA	Log (Bank Size)(log S)	0.1917	+	0.0448
ROA	Capital Adequacy Ratio (CAR)	0.6111	+	0.0000
ROA	Business per Employee (BPE)	0.3660	-	0.0001
ROA	Credit Deposit Ratio (CDR)	0.4471	+	0.0000
ROA	Log (The percentage Net Non-Performing Assets) (log NNPA)	0.7276	-	0.0000
ROA	Interest Income to Average Working Funds (IIAWF)	0.6188	+	0.0000
ROA	Noninterest Income to Average Working Funds (NIIAWF)	0.5837	+	0.0000

Regression was performed between the dependent variable ROA and all the independent variables. The impacting independent variables as indicated by the P Values were log bank size, the credit deposit ratio, log Net NPA, interest income to average working funds and business per employee. Other variables were excluded from further analysis (Tables 4, 5). The AIC value improved slightly on excluding non-impacting variables confirming the goodness of fit (Tables 4, 5).

Table 4: Results of Regression, ROA= function (All independent variables)

Dependent Variable	Independent Variable	Coefficient	P Value	AIC
ROA	Constant	-2.43547	0.0000	61.69
	Log S	0.125170	0.0000	
	CAR	0.0228249	0.1836	
	BPE	-0.0241205	0.0044	
	CDR	0.0110042	0.0101	
	Log NNPA	-0.307363	0.0000	
	IIAWF	0.130247	0.0000	
	NIIAWF	0.110322	0.1227	

Table 5: Results of Regression, ROA = function (Impacting variables)

Dependent Variable	Independent Variable	Coefficient	P Value	AIC
ROA	Constant	-2.27348	0.0000	61.62
	Log S	0.125170	0.0000	
	BPE	-0.0278069	0.0011	
	CDR	0.0171725	0.0000	
	Log NNPA	-0.346228	0.0000	
	IIAWF	0.124045	0.0000	

The results of the tests for normality of residuals and heteroscedasticity accepted the alternate hypotheses. Thus the residuals are not normally distributed and heteroscedasticity is present in the data (Table 6).

Table 6: Tests for Normality of Residuals and Heteroscedasticity

Test	Null Hypothesis	Test Statistic	P value
Test for normality of residual	Error is normally distributed	Chi-square(2) = 20.39	0.0000
Breusch Pagan test for heteroscedasticity	Heteroscedasticity not present	LM = 23.0954	0.0003

The results of the tests for multi-collinearity show that the variance inflation factors of all impacting variables were below 5 suggesting there is no problem with multi-collinearity (Table 7).

Dependent Variable	Independent Variable	Variance Inflation Factors
ROA	Log S	1.853
	BPE	1.247
	CDR	1.894
	Log NNPA	1.575
	IIAWF	2.288

With the residuals not being normal and heteroscedasticity being present in the data we can't rely on the regression results and a more robust estimation involving either a panel regression or quantile regression is required. The Quantile regression technique was used in this study to get a more robust estimation.

The quantile regression performed between the dependent variable ROA and all the independent variables indicated that the impacting variables were log bank size, the capital adequacy ratio, log Net NPA and interest income to average working funds. Other variables were excluded from further analysis. The AIC values indicate that the goodness of fit remains intact (Tables 8, 9).

Dependent Variable	Independent Variable	Coefficient	P Value	AIC
ROA	Constant	-2.75936	0.0000	44.55
	Log S	0.130458	0.0008	
	CAR	0.0427711	0.0089	
	BPE	-0.00285481	0.7995	
	CDR	0.00777203	0.1466	
	Log NNPA	-0.256464	0.0000	
	IIAWF	0.137602	0.0008	
	NIIAWF	0.111658	0.1537	

Table 9: Results of Quantile Regression, ROA= function (Impacting variables)

Dependent Variable	Independent Variable	Coefficient	P Value	AIC
ROA	Constant	-3.19130	0.0000	61.62
	CAR	0.0636988	0.0000	
	Log S	0.177443	0.0000	
	Log NNPA	-0.263420	0.0000	
	IIAWF	0.181940	0.0000	

Discussion and Analysis:

This research study attempted to examine the profitability of the largest listed commercial banks in India that constitute the bank nifty index. The study looked at the impact of some key determinants on profitability of listed public and private sector banks in India over a 10-year period. 4 listed public sector banks and 7 listed private sector banks that are constituents of the bank nifty index with a listing history of at least 5 years were considered for the study (Table 1) that covered the period from the financial year ending March 2009 to the financial year ending March 2018.

Bank profitability was measured by the return on assets (ROA). The determinants of profitability studied were measures of size, asset quality, capital adequacy, income, productivity and lending. Quantile regression analysis were used to analyze the impact of these determinants on bank profitability.

Asset quality proved to be a highly influential determinant of bank profitability (Table 9). A measure of asset quality percentage the logarithm of Net NPA, negatively impacted profitability as measured by the return on assets. Zarrouk et al., (2016) similarly found that asset quality was a key determinant of profitability of a sample of 51 Islamic banks in the Middle East and North Africa (MENA) region.

Capital adequacy positively impacted bank profitability as measured by the return on assets (Table 9). While examining a sample of Indonesian banks from 1990-2005, Sufian & Habibullah, (2010) also found that highly capitalized banks were more profitable.

Bank size significantly positively impacted profitability as measured by the return on assets (Table 9). Dietrich and Wanzenried, (2011) similarly observed a positive impact of stock market capitalization on bank profitability when studying 453 banks in Switzerland from 1999 to 2008.

Interest income measures impacted bank profitability as measured by the return on assets positively (Table 9). Interest income is the major source of income for most Indian banks. Ganesan, (2001) also found this to be true for a large sample of public sector banks in India studied over a 4 year period. The study has implications for key stakeholders of banks. Bank managers can focus on asset quality and control non-performing assets to maximize ROA. Bank managers can also ensure their banks are well capitalized and maximize their capital adequacy levels ahead of industry norms to increase their ROA.

Investors can identify profitable banks by looking for well capitalized banks that have capital adequacy levels well in excess of industry norms. Investors can also focus on banks with very high asset quality as these banks tend to be a lot more profitable than their counterparts. The RBI can continue to tighten asset quality norms to help banks identify problem assets well in advance. The RBI can require banks to have a robust loan recovery process for identified problem loans, to enable banks to maintain and improve their profitability. With the implementation of Basel III norms, the RBI can ensure that banks are well capitalized and have capital adequacy levels in excess of Basel III requirements that will help banks absorb any major external shocks.

Conclusion:

This study focused on the impact of some key internal determinants of profitability on the profitability of listed commercial banks in India. The measure of profitability used in the study was the return on assets (ROA). The internal determinants selected were bank size as measured by market capitalization, a lending measure namely the deposit to credit ratio, income measures covering interest income to average working funds and noninterest income to average working funds, a key productivity measure in business per employee, a measure of capital adequacy which is the capital adequacy ratio and a measure of asset quality as determined by the percentage Net NPA.

Measures of size, asset quality, capital adequacy and interest income proved to be influential determinants of profitability as measured by the return on assets. Thus bank managers must focus on asset quality, improve their capital adequacy and increase their interest income streams to improve profitability. Investors can focus on these parameters to identify highly profitable banks. The RBI can monitor these parameters as they seek to help banks overcome the ever present challenges of asset quality and capital adequacy in today's ever changing banking landscape.

Limitations:

The study only considered the impact of a select group of internal determinants on profitability of listed commercial banks in India. Only listed public sector and private sector banks in the bank nifty index that have been listed for a period of at least 5 years were considered for the study. External determinants like macroeconomic factors and exchange rates were not considered. Additionally qualitative factors such as customer preferences and customer service were not considered. The impact of technology as a determinant was also not considered. In addition, the study also assumed variables vary linearly with each other which may not be the case, always.

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