Impact of Financial Ratios on Stock Price: Evidence from Indian Listed Banks on NSE

Nitish Rane[1]; Pooja Gupta[2*]

[1]Symbiosis Institute of Business Management, Symbiosis International (Deemed University), Electronics City, Hosur Road, Bengaluru, Karnataka, India.

[2*]Symbiosis Institute of Business Management, Symbiosis International (Deemed University), Electronics City, Hosur Road, Bengaluru, Karnataka, India.

[2*]poojagupta@sibm.edu.in

Abstract

This study aims to examine the impact of financial ratios on the stock prices of companies listed on NIFTY Bank. Nifty Bank is a sub-index of NIFTY 50 and has various listed banks included based on the criteria given by NSE. This study data has been taken from the period 2010-2019 and taken from the company annual reports. The analysis is done using panel data regression and other tests to verify the best model for the dataset. The results obtained from this study show that the capital adequacy ratio and the dividend payout ratio do not impact the stock price. In contrast, earnings per share, net NPA ratio, and basic earnings per share, net profit margin, and net interest margin exhibited a relationship with the stock price. In the Indian context, there is less research available on this topic, and the idea chosen for the study is original. Along with this, the data collected for the study and the code used for analysis is original work. New investors can use the results of this study in the Indian stock market to analyze a stock and take proper investment decisions. Another practical usage of this study is that banking sector companies can improve their ratios to attract new investors.

Key-words: Indian Stock Market, Financial Ratios, Regression Analysis, Panel Data, Banking Industry, Investors.

1. Introduction

Indian stock market has developed over the years and is the 10th biggest stock market with a market capitalization of $2.15 trillion. This development has attracted a huge number of first-time investors; this statement can be supported by the increasing growth in investor accounts as recorded by the Central Depository Services (India) Ltd. From December 2019 to April 2020, the growth in the investor accounts is from 200000 to 600000 per month, which is mainly due to the attractive

opportunities in the Indian Stock Market [1]. With these increasing investors, they must choose the stocks that would perform in the future or long term, which can be done using fundamental analysis of the stock, which requires the investor to analyze the financial statements and ratios of a particular stock [2].

Financial ratios like the market ratios, profitability ratios, and liquidity ratios can give an investor an overall analysis of the company's performance. Using these ratios, a new investor can decide the investment in a particular stock or an index. To reduce the risk and to move with the market, many investors choose indices like NIFTY 50 or NIFTY Bank. These indices compromise the most liquid and profitable stocks and are attractive to new investors. Investors who enter these markets have a long-term investment plan for which fundamental analysis is required. However, there is no such work available on the Indian stock market using which decisions can be made regarding a new investment. Hence, this study aims to bridge this gap by considering the financial ratios of companies included in NIFTY Bank and the stock prices to find the relationship and the important ratios that impact a company's stock price [3].

Data for the study is collected from the listed company's annual report, and the data collected is panel data for 10 years and the stock price from the NSE database. For this study, NIFTY Bank is chosen because, according to the NSE database, the correlation between NIFTY 50 and NIFTY Bank is 0.83 since its inception and a correlation value of 0.91 for 2014 19. Because of the high correlation between NIFTY 50 and NIFTY Bank, the results from this study can also be applied to companies included in NIFTY 50. Financial ratios are chosen based on the studies about important ratios used to analyze a company's performance [4]. Ratios considered are related to the banking sector like Net NPA ratio (NPA), Capital Adequacy Ratio (CAR), and net interest margin (NIM). Other ratios used for the analysis are the Return on equity (ROE), Earnings per share (EPS), Net profit margin (NPM), and the Dividend Payout Ratio (DPR). Panel regression models like the Pooled OLS, Random Effects Model (RE), and Fixed Effects Model (FE) are used on the panel data in this study. The output obtained from this study can be useful for first-time investors looking for opportunities in the stock market and firms that can work towards improving these financial ratios to attract investors [5].

2. Literature Review

In predicting stock market performance based on financial ratios, there is less known work in the Indian stock market. India is one of the rapidly developing countries. It has grabbed the interest of many investors to invest in the Indian stock market. Therefore it is necessary to focus on studies

regarding Indian stock market performance. Some papers predict the stock market performance or the stock index performance [6]. That predicting out-performing stocks using financial ratios is possible by binary logistic regression, observes Data. This study's dependent or control variable is the stock market performance, which is further classified as "GOOD' or "BAD" based on the previous performance of the stock. This study shows that with an accuracy of 74.6 percent, it is possible to classify out-performing stocks [7].

The impact on stock prices in the food industry by the financial ratios on a data from 1992 to 2010 was found out by Kohansal in his research. The financial ratios selected were current ratio, asset turnover, financial leverage, and return on assets, and return on equity. The paper uses the ordinary least squares method to find out the predictive coefficients for the financial ratios to determine which ratio affects the stock prices the most. The results were used to study the price volatility and the relation with financial ratios [8].

The relationship between monthly stock returns in the Malaysian stock market and three chosen financial ratios were found based on Kheradyar's research. The period chosen was 2000 to 2009 for analysis which used panel data regression techniques. The author preferred generalized least squares over ordinary least squares in order to tackle non-normality and heteroscedasticity. The study's findings suggested that the prediction of stock returns is possible by sing market financial ratios [9].

A study conducted on the Indonesian Cement Industry listed on IDX was done, observed Khadafi. The annual returns on these stocks were predicted using ROE and D/E ratio using multi-linear regression. The data collected for stock price, which is the dependent variable, is calculated based on buying and selling stock on exchange at the end of the year. The study's timeframe is 2011-2015, where several financial ratios and the stock price data were collected and then analyzed to find out the relation between them. The results showed that both ROE and D/E ratios affected the stock price simultaneously, and when tested individually, it was noted that they had a positive effect on the stock price [10].

(Khan, 2012) Studied the relationship between the stock returns of companies listed on the Karachi Stock Exchange and the financial ratios. For analyzing the data, the author has considered eight hypotheses that have been tested. The data is equally divided into two samples to reduce the effect of random sampling error. The statistical tool used is simple linear regression as well as multiple linear regression to test the hypotheses. This study showed that the Book to Market ratio had a more predictive power compared to other financial ratios [11].

The relation between the stock price of listed companies on the Colombo Stock Exchange and some selected accounting ratios was found out by Menike. It was found that at a 1% significance level, the accounting ratios/variables significantly impact changing stock price, testing the hypotheses constructed. The paper further suggested that instead of the stock price as the dependent variable, the stock returns should be considered for further research in this field. These other macroeconomic factors, such as the exchange rate, should also be considered [12].

Banking companies listed on Indonesia Stock Exchange to determine the relationship between financial ratios and stock price using a multi-linear regression model was researched by Wijaya. The companies were selected if they met certain criteria listed by the author, who led to a sample of 29 companies, and the data sample was used from 2010 to 2014. The annual stock returns were calculated as the average monthly average returns of the stock. This study showed that some financial ratios had insignificance in determining the stock returns and was suggested to ignore or use them in a transformed manner for further research [13].

A study on the Tehran Stock Exchange to determine the impact of financial ratios on the stock returns of the current year and the future year was conducted by Emamgholipour. This study randomly sampled 80 companies among the listed companies and considered four years from 2006 to 2010. The findings of this study varied from the previous research as it was concluded that the P/E ratio and M/B ratio harm stock returns [14].

A study done by Pech proposes a set of financial ratios, which can be used to predict the stock returns. This study consisted of testing a set of "preferable" financial ratios to determine which set predicts the stock returns more accurately. This study has successfully decreased the preferred set of financial ratios from 36 to 14. The stock prices and the accounting data used in this study are quarterly data converted to trailing 12-month (TTM) data. This study has used regression analysis to find the preferred accounting ratios that can predict stock returns.

Through their study there is a correlation between stock prices and the accounting ratios and found out that investors can expect abnormal returns and the company can expect excess earnings, confirmed Ball. The data collected regarding the earnings of a company were used from the income statements and the security prices from S&P Comp stat tapes. This study has led to further studies about the relationship between stock price and accounting ratios.

A study about the insurance companies in Jordan was done by Kabajeh, which found through pooled regression analysis that there exists a strong relationship between ROA, ROE, and ROI with the stock price of the selected companies. The data collected for the study spans from 2002-07 for 28

selected companies. There was a weak relation between the selected variables and stock price when analyzed separately but had a strong relationship when used together.

A study on commercial banks listed on the Dhaka stock exchange to determine a relationship between stock price and dividend policy was done by Masum. The ratios used in this study were returned on equity, retention ratio, dividend yield, earnings per share, and profit after tax. The paper concluded that the return on equity and earnings per share positively affected stock price, whereas the other ratios harmed the stock price.

The impact of dividend and earnings announcement on the stock prices was discussed about by Gupta. The paper looked at BSE 100 companies. The ratios used in this case were the Dividend Payout ratio and Earnings per Share.

3. Research Objective

This study aims to find the relationship between the financial ratios and the stock price of selected companies. A model can be developed to help investors in fundamental analysis of the stock using the relationship obtained. The study aims to find the relationship of banking sector-specific ratio like Non-Performing Assets (NPA), Capital Adequacy Ratio (CAR), and Net Interest Margin (NIM) on the stock price of the banks selected [15].

4. Methodology and Data Collection

In this study, the relationship between a banking firm's stock price and ratios is computed using a panel data regression model. The studies mentioned in the literature review have used different regression models ranging from simple linear regression to panel data regression. The data collected for this study has two cross-sectional dimensions as well as time-series data. The data is collected for 10 years, the time series, and 10 different companies, which is cross-sectional. Due to this multidimensional nature of the data, a panel regression model is used instead of a simple linear regression model. In this study, financial ratios are considered, which are available in annual reports published by the company. The stock prices are the closing stock prices of the selected banking firms. Panel data regression is available for a balanced as well as an unbalanced dataset. Better results are obtained when balanced panel data is used. For this purpose, a 10-year time-series data for 10 different banking companies included in the NIFTY Bank is considered.

4.1. Analysis of Model – Panel Data Regression

The data collected for this study is two-dimensional data with cross-sectional and time-series dimensions. Due to this nature of data, a panel regression model is better suited than the general regression model. Panel data regression is a multidimensional analysis technique used to find the relationship between independent variables and the control variables are chosen.

Panel data regression has three types of models: the Pooled OLS, the Random Effects Model, and the Fixed Effects Model. These models have their unique characteristics to build a model.

4.2. Pooled OLS Regression

This model considers the dataset as one dimension: the time-series model and the individual or cross-sectional dimension are not considered. Pooled OLS model is less preferred for panel data due to its limitation in considering both the dimensions. Pooled OLS model considers the whole dataset as a homogenous dataset. Pooled OLS may not be effective in the presence of heteroscedasticity. The Pooled OLS equation is as follows,

$$y_{it} = a_i + bx_{it} + \epsilon_{it}$$

Here $_{it}$ denotes the dependent variable, $_{it}$ is the control variable, I denote the individual cross-sectional data, and t is the time-series dimension of the data. ϵ_{it} is the error term, and a_i is the common y-intercept.

4.3. Fixed Effects Model

Fixed Effects model (FE) is built on the assumption that the entities have constant variance and equal slopes. For the calculation of the estimator, this model uses the least square dummy variable (LSDV). LSDV is similar to OLS with a dummy variable where the assumption for variance and slope is satisfied. The second assumption is that for time-varying dependent variables, they are not perfectly collinear. It is difficult to identify the intercept coefficient in this model. The fixed-effects model equation is,

$$y_{it} = bx_{it} + \epsilon_{it}$$

The variables indicate the same notations as in Pooled OLS model.

4.4. Random Effects Model

Random Effects Model is built on the assumption that the individual effects are uncorrelated. In this model, the error is calculated using two different terms: individual effects and one term that capture error in both dimensions. The random-effects model uses a random selection of individuals from a single group. The dummy variables used in the fixed effects model are included in the error term of this model.

$$y_{it}=a_i+bx_{it}+\epsilon_{it}+v_{it}$$

ϵ_{it} is the error term, and v_{it} is the multidimensional error term, and the variables indicate the same notations as in Pooled OLS model.

4.5. Breusch-Pagan Lagrange Multiplier Test and the Hausman Test

The panel data models available use different formulae and techniques to calculate the model estimator. Two tests are available in statistics to choose from amongst these models. The Breusch-Pagan Lagrange Multiplier test tests the better model between Pooled OLS and the other two models. The next test is the Hausman test to identify the better model between Random Effects and Fixed Effects Model.

The results of these tests are used to determine the best model estimator among the three models available. The output is based on the significance level of the alternative hypothesis. A significant value is greater than one, and when the output has a significant value, the null hypothesis is rejected due to a lack of evidence for acceptance. The hypothesis for these two tests is fixed, and these tests are done after computing the model estimators [16]. Two software are readily available to perform panel data regression, which is STATA and R program. In the R software to run panel data regression, a Panel Linear Model package (PLM) needs to be installed. This package has all the tools required in computing the Pooled OLS, Fixed Effects Model, and the Random Effects Model. Along with these using the plm package, it is possible to determine the best model using the LM Test and the Hausman Test.

4.6. Data Collection

The financial ratio data is collected from the company's annual reports, and the stock price data is taken from the NSE database. The ratios chosen are divided into two groups. The ratios are considered in two groups, out of which the first group consists of bank sector-specific ratios like the

NIM, NPA, and CAR. The second set of ratios used is the Earning per Share (EPS), Dividend Payout Ratio (DPR), Net Profit Margin (NPM), and Return on Equity (ROE). The bank-specific ratios are included in annual reports published by the banks to publicize their performance to its shareholders and new potential investors. Ten years is chosen and 10 different companies to get a balanced dataset for the whole regression model.

Net NPA Ratio: This ratio is used to assess the quality of the loan book of a particular bank. A lower ratio indicates that the bank has fewer bad loans, which creates a positive sentiment among investors.

Net Interest Margin: This ratio is calculated using the difference between the incomes generated from interest by a bank and the expenditure on interest provided to the lenders is the net interest margin. The higher the NIM ratio better is the overall performance.

Capital Adequacy Ratio: This ratio measures the capital of the bank to its risk-weighted assets. The ratio determines how protected the depositors of the bank are.

Net Profit Margin: This ratio is calculated by dividing the net profits by the revenue generates. Net profit is calculated by subtracting taxes, interest, cost of goods sold, and other operating expenses from revenue.

Earnings per Share: This ratio is calculated using the net income divided by the outstanding common stocks available. This ratio indicates the profitability of a company.

5. Empirical Results and Analysis

The panel regression model is available on R software using the plm package. PLM package provides analysis of data for balanced as well as unbalanced panel data. The number of years considered for this study is 10 years for 10 different companies included in NIFTY Bank. As mentioned in the model analysis, after computing the results for all the three different models available, two tests are done to choose the model with the best estimator. The first test is done using the LM test, followed by the Hausman Test to select the final model.

5.1. Model Selection

The model selection is done based on the significance of the output of the two tests. After comparing the estimators of each model, the final model is confirmed. The first test was done

between the Random Effects Model and the Pooled OLS. In plm package, available in R software, using 'plmtest,' we can compare the time-effects and the individual model.

5.2. Breusch-Pagan Lagrange Multiplier Test

The LM test is done to determine the better model estimator among Pooled OLS model compared to both Random Effects and Fixed Effects Model. The null hypothesis for this test is that the Pooled OLS model is better than the other two models. The alternative hypothesis considered for this test is that either of the tests is better than Pooled OLS. Based on the output and acceptance or lack of evidence for acceptance of the hypothesis, the model is chosen. The test for balanced labels is shown in Table 1.

Table 1 - Test for Balanced Panels

Lagrange Multiplier Test
Data: Stock. Price ~ CAR+NPA+NIM+DPR+NPM+EPS+RONW
Normal = 10.379, p-value < 2.2e-16
Alternative hypothesis: significant effects

The output indicates that the Random Effects Model is the better model estimator based on the null hypothesis rejection. The alternative hypothesis has significant effects, which suggests a lack of evidence for acceptance of the null hypothesis, and therefore we choose the alternative hypothesis.

To confirm the better model between Pooled OLS and Fixed Effects Model, 'pF-test' is used, comparing the estimators of both models. The criteria for the selection of a model are the same as the above test.

Table 2 - Test for Individual Effects

F-Test
Data: Stock. Price ~ CAR+NPA+NIM+DPR+NPM+EPS+RONW
F=16.526, p-value =1.629e-14
Alternative hypothesis: significant effects

The output indicates that the Fixed Effects Model is the better model estimator based on null hypothesis rejection. The alternative hypothesis has significant effects, which suggests a lack of

evidence for the acceptance of the null hypothesis, and therefore we choose the alternative hypothesis. Test for Individual effects is shown in Table 2.

5.3. Hausman Test

The Haussmann test is based on hypothesis acceptance or rejection. The null hypothesis for this test is, the individual effects are uncorrelated. The alternative hypothesis is, the individual effects are correlated. The null hypothesis acceptance suggests that the fixed effects model is the better model estimator.

Table 3 - Model Consistency Test

Hausman Test
Data: Stock. Price ~ CAR+NPA+NIM+DPR+NPM+EPS+RONW
Chisq=1.3917, p-value =1
Alternative hypothesis: one model is inconsistent

The output indicates that the alternative hypothesis is true by indicating that one model is inconsistent. Therefore the alternative hypothesis is accepted as there is a lack of evidence to accept the null hypothesis. Therefore the fixed effects model (FE) is used for computing the regression equation. Model Consistency Test is shown in Table 3.

5.4. Fixed Effects Model

Fixed effects model (FE) considers a non-random means in a group, whereas for the random-effects model, the group means randomly selected data. Based on the tests done, the best suitable model for the dataset is the fixed effects model, as one of the models is inconsistent. Using the palm package available panel regression using the fixed-effects model was done.

To use the fixed-effects model in R Studio, the specific syntax used in PLM is 'within' to indicate that the model to be used is the fixed effects model. The within command indicates that the mean calculated should not be for randomly selected data within the individual set. The mean calculated should include all the data within the individual selected. Panel Regression Output is shown in Table 4.

Table 4 - Panel Regression Output

Coefficients	Estimate	Standard Error	P-value
CAR	9.048	18.44	0.625
NPA	-71.56	22.25	0.0019*
NIM	71.01	41.82	0.093
DPR	-0.102	0.38	0.790
NPM	32.77	10.63	0.002*
EPS	2.84	0.63	2.882e-05*
RONW	-32.53	10.17	0.002*
R-squared	: 0.80843		
Adjusted R-squared : 0.74372			
p-value < 2.22e-16			

Note: The values marked with '*' are significant at the considered confidence level.

There is no intercept coefficient in a fixed-effect model compared to the other models, as can be seen in the above output. Based on the regression output, the equation at 95% confidence interval is,

$$Stock.\ Price = -71.566(NPA) + 32.77(NPM) + 2.84(EPS) - 32.537(RONW)$$

The regression output shows that out of seven different variables chosen, four variables are significant at 95 percent confidence interval: NPA, NPM, EPS, and ROE. Among the significant ratios, the NPA ratio is a bank-specific ratio that gives non-performing assets or bad loans. The higher is the NPA ratio; the lower is the bank credibility. The coefficient of NPA has a negative value, indicating that the stock price decreases as the ratio increases. The NPM has a positive magnitude coefficient, indicating that the stock price increases with a surge in the ratio, which suggests that positive sentiment is built among investors for a higher profit margin as there would be more demand for the bank's share. The EPS has a positive impact on the stock price and suggests that the higher the ratio higher is the investment in the shares, which leads to a rise in demand for the stock and the stock price increases. The ROE of the company harms the bank's stock price, which has been the same for a study done by Indonesian banks where the ROE harmed the stock price. The EPS, ROE, and NPM are significant and the same results obtained by which suggested a group of financial ratios to analyze the stock returns. The Net Interest Margin is also a significant variable but at a lower confidence interval as seen in the output. The Net Interest Margin also has a positive impact on the stock price, which is true as the more the revenue generated from the interests by the bank, the more is the positive sentiment for investors in the bank.

6. Conclusion

This study has used panel data regression to find a relationship and determine ratios that significantly affect stock prices. In the Indian stock market context, less study is available to determine how the financial ratios impact stock price. Hence, this paper bridges the gap this paper by building a model to show how financial ratios impact a company's stock price. An investor can use the results obtained in this study to analyze a stock and take decisions based on the results. It is observed that at 99% and 95% confidence interval, there are four significant ratios with an adjusted R squared value of 74.3 %, which suggests that out of the seven ratios selected, four ratios can predict the stock prices correctly with an accuracy of 74.3 percent. There are five significant ratios for a confidence interval of 90 percent, which can predict the stock price correctly about 74.3 percent times. The two significant ratios, which are ROE and EPS, are also the recommended variables by study. The coefficients of the ratios are higher due to the value of stock prices. It can be concluded that the stock price is negatively impacted by the net NPA ratio looking at the signs of the coefficient, which is true as higher Net NPA ratios reduce the credibility of the bank and then affects the share price as well. Having a higher NIM, EPS and NPM have a positive effect on the stock price. The ROE negatively affected the stock prices, which resulted from a study that tried to find the relation between the stock price of a bank and its financial ratios listed on the Indonesian Stock Exchange.

This research has constraints in the topic of sector selection, population size, and ratio selection. Future work in the Indian Stock market context needs to analyze different NIFTY sectors to determine the common ratios that affect the stock price. The data collected in this study is from the available annual report; future work in this field can be looking at a larger dataset which was not possible due to data availability constraints.

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