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RESULTS & DISCUSSION

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- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

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ONLINE RESOURCES

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WEBSITES

- Garg, Bhavet (2011): Towards a New Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

A STUDY ON THE IMPACT OF CHANGE IN REPO RATES ON BANK STOCKS IN INDIA

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ABSTRACT

Almost a week before every bi-monthly policy of the Reserve bank of India, many analysts forecast the impact the change in repo rate might have on the stock market. This speculation also includes an impact on the bank stocks. Particularly because the impact of the repo rate has on the operations of the bank. Repo rate is the rate at which commercial banks borrow money from the RBI. The increase in repo rates makes loans costlier thereby reducing the number of customers for a commercial bank and vice versa. This led to the inquisitiveness to analyse whether this operational impact owes the shareholders to change their investment decisions. This change can be observed by studying the stock prices of banks, which for the study have been attributed to the S&P BSE BANKEX, which is an index consisting of 12 public and private sector bank. The paper aims to study the impact of change in repo rates on bank stocks in India. This paper is restricted to study the impact on the day of the change. The study was conducted using various statistical tools like regression analysis, correlation, residual plot and normal probability plot. After the study was successfully conducted from the data taken from the RBI website, it was apparent that there is no significant impact of change in repo rates on the bank stocks on the day of the change. Hence, all speculations and forecasts regarding their relationship are flawed and do not hold true for bank stocks in India.

KEYWORDS

Reserve Bank of India, repo rate, bank stock, S&P BSE BANKEX.

INTRODUCTION

Repo rate is the rate at which banks can borrow money from the RBI. This rate is one of the most important instruments used by the RBI to control credit, money supply and inflation in the economy. It has an inverse relationship with the amount of credit and money supply. This is because when the RBI increases the repo rate, it becomes costlier for banks to borrow excess funds from the RBI and hence the amount of money available to lend reduces, thereby reducing the amount of credit and money supply in the economy. Whereas, when the RBI decreases the repo rate, it becomes cheaper for banks to borrow money from the RBI and lend the same to its customers thereby increasing the amount of credit and money supply in the economy. Hence, whenever the RBI reduces repo rate most banks start reducing the rate at which they lend loans thereby inducing more people to borrow from banks and vice versa. This passing on of the benefit to the customers leads to more impact on the money supply. Due to this change as the money supply in the market increases, people are ready to pay more and more for a particular product and hence the demand for goods increase and the supply remains constant. This phenomenon leads to a research gap to find out the impact of changes in repo rates on bank stocks since the operational impact is quite evident.

REVIEW OF LITERATURE

BOFA-ML (2015), The article talks about the impact of lowered rates on inflation in the country. It states that inflation will be below 6% mandate set by RBI. This will lead to more purchasing power, which is likely to be invested in the economy. According to this cycle the additional investment in the economy will lead to a growth in the markets, which will in turn lead to an increase in the prices of stocks.

DAVID ASHWORTH (2015), The article talks about the varied reasons and implications of the repo rate cut by the RBI in January 2015. One of the most important reasons behind the cut was to maintain the low CPI and WPI. The probable impact of the cut was a tremendous 2.6% increase in the S&P BSE SENSEX index with banks being the biggest gainers. The writer also appreciates the sudden move by the RBI because it led to a better reaction by the markets. The article also explains how a rate cut by the RBI induces foreign investors in USA to more actively invest in the Indian market.

ANAMIKA SINGH (2014), The study intends to know the monetary policy key rates relation with NIFTY and Bank NIFTY, to measure the inflation influence on key interest rates, to measure the monetary policy rates influence on selected economic indicators, and to find the CRR impact on stock market volatility. The paper concludes that CRR and SLR are negatively co- related with the market indices due to more money being locked up in these reserves. The paper also states that there is a further scope to do research on monetary policy changes impact on market benchmark behaviour.

VIVEK SHARMA (2013), The article states that a change in the repo rate acts as a catalyst agent for the markets. This is because the rumours about the expected change in the rates spur the market even before the news is out. The article also states that it is difficult to judge the impact of the change in rates because it has many long term effects on the market and the money supply which will not be prevalent in short term or in a day's time. This assessment makes sense since the impact of the rates on the lending chain will only be seen in long term, as banks will lower their rates, therefore the impact on the market on the day of the change is a very narrow scope to judge the impact of the repo rate.

PALLAVI INGALE (2012), The study is concentrated to find out the impact of RBI policy on inflation. The study concluded that though the rising interest rate will hurt the economy in the short run, the increasing trend of interest rate will in the long term help in bringing down inflation. This is because it will curb the excess money supply in the economy leading to decrease in demand and ultimately reducing the prices of goods and services.

NEED AND SIGNIFICANCE OF THE STUDY

- **AID TO THE RBI IN THE FORMULATION OF POLICIES REGARDING THE REPO RATE**

The relationship between the change in repo rate and the effect on bank stocks will provide a base to the central bank to study the market and formulate the repo policies accordingly. Since the study also evaluates the degree to which it impacts the bank stocks, it will be easy to know the impact of change in repo policies by the RBI.

- **SETTING MARKET TRENDS**

The study of this impact will help bankers and brokers in their daily activities because a definite trend creation would then be possible based on this historical data analysis.

- **EFFICIENT USE OF HISTORICAL DATA**

The relationship between change in repo rate and trend of bank stocks will help in efficiently using the historical data available and will provide a base for future use.

- **FORMULATION OF A THEORY**

There exist various views of experts on the impact of repo rate on bank stocks and they widely differ from each other. This intense study of the two will lead to a formulation of a theory which will be very helpful in the future for the economy.

- **USEFUL FOR BANKS**

Since the banks will be aware about the degree to which the repo policies will affect their stock prices and in which way, the bank can plan accordingly for their future course of action in case of any change in the policy, without disturbing their operations to a large extent.

OBJECTIVES OF THE STUDY

1. To analyse the impact of change in repo rates on bank stocks in India
2. To analyse the degree to which change in repo rates can impact the stocks of banks in India
3. To test the theory – "Increase in repo rates leads to a decrease in stock prices" with respect to bank stocks

SCOPE OF THE STUDY

The scope of the study is limited to India and to the capital markets of India (BSE and NSE). This is because the policies followed by the central bank of each country differ from another and the market situations in each country also differ from the other. Additionally, the capital markets of each country differ from the other in nature (developed/developing), type (bullish/bearish) and reaction to situations. The analysis was conducted taking into consideration of daily stock prices of the banks.

The data was collected for a period of 15 years from 31-03-2000 to 29-09-2015 to make the study more reliable and accurate. However, the data for BANKEX was not available for the period from 2000-2003, which made it difficult to consider this period for the study. Hence, all such dates were excluded from the study to make the results more accurate. Thus, effectively the data used for the study is only for 11 years; from 31-03-2004 to 29-09-2015.

METHODOLOGY OF THE STUDY

- **SOURCES OF DATA**

The study is based on the secondary sources of data, collected through the statistical data made available by the Reserve Bank of India website and other related websites. The data for the study was collected in 2 parts; Market data from BSE BANK INDEX and repo rate data from the RBI statistical database.

- **SAMPLE SIZE**

The collected data was then simplified and recorded only for the dates on which the repo rates were changed by the central bank. This step helps in a better analysis of the data because it makes it more comparable and logical. The simplification was required to limit the scope of the study to only "change" in repo rates and not any record the impact of any external factors. Although the study is to analyse the impact of repo rate change, the data used is that of BSE BANK INDEX because it is a widely accepted measure of bank stock movements in the country. It is made up of the stocks of 12 major banks of the country including both public and private sector. The 12 banks included in the index are shown in table 1.

TABLE 1: LIST OF BANKS INCLUDED IN THE S&P BSE BANKEX

NAME OF THE BANK	SECTOR
Axis Bank	Private Sector
Federal Bank	Private Sector
HDFC Bank	Private Sector
ICICI Bank	Private Sector
IndusInd Bank	Private Sector
Kotak Mahindra	Private Sector
YES Bank	Private Sector
Bank of Baroda	Public Sector
Bank of India	Public Sector
Canara Bank	Public Sector
Punjab National Bank	Public Sector
State Bank of India	Public Sector

(*Source:* www.moneycontrol.com)

In the above table the index has an appropriate mix of all major public and private sector banks of the country, so the value of the index will be a true representative of the banking industry in India. It will also guarantee a smoothening in the data since the index is calculated by using the modified market capitalization method. This method ensures that the index is calculated based on user defined weighting, thereby ensuring that a true representative value is achieved. Hence, this index can be used for the study to form a reliable and accurate conclusion.

The sample technique used was convenience sampling under non-probability sampling. This is because the most recent data which was easily available was recorded and analysed for the study

- **STATISTICAL TOOL**

The tool used for the study is Linear Regression Analysis, Correlation and R- squared.

DATA ANALYSIS AND INTERPRETATION

After organising and describing the data required for the study, the following interpretations were made using different analytical tools.

- **NEGATIVE INSIGNIFICANT CORRELATION**

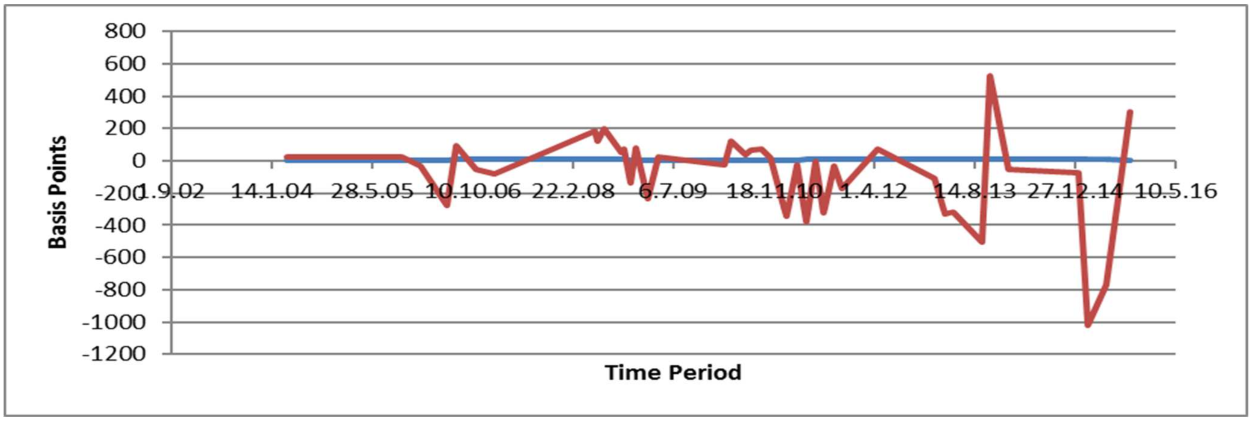
The study of the two variables X (Change in repo rate) and Y (Change in BANKEX) shows that the correlation between the two variables is -0.06558 as depicted in the table -1

TABLE -1: CORRELATION TABLE

	X	*Y*
X	1	
Y	-0.06558	1

The correlation between two variables can also be depicted using a scatter chart, which makes the interpretation of the relation easier and clear.

GRAPH 1: CORRELATION SCATTER CHART



Analysis and Interpretation

From graph 1 and aforementioned calculations, it is apparent that there is negligent or no correlation between the two variables being studied. This is because the correlation is -0.06 or -6%, which is very low compared to the extremes which are 1 and -1(100% or -100%). However, the correlation has a negative value, which portrays that the correlation is negative. This means that a change in X will lead to an opposite change in Y. Similarly it can be conclude that a change in repo rate does not lead to a significant change in bank stocks. However, the small change in bank stocks has a negative relationship with change in repo rates. This means that an increase in repo rate will lead to a very insignificant decline in the bank stocks. It can also be concluded that there are stronger factors that have an impact on bank stocks, other than a change in repo rates.

- **NEGATIVE MARGINAL REGRESSION**

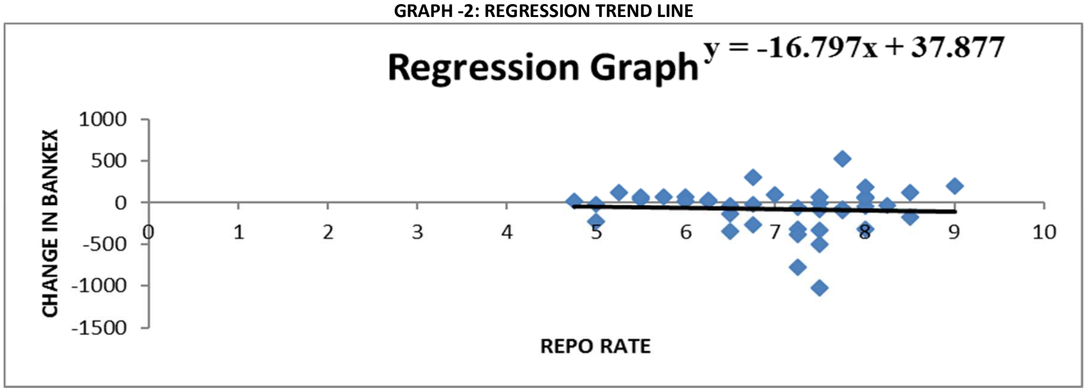
The linear regression equation of the two variables as calculated using the above mentioned formula is as follows;

Y= 37.87+ (-16.798) X

Analysis and Interpretation

The above equation shows that with every 1 unit change in X there is a -16.798 unit change in Y. In other words, with every 1 basis point change in repo rate there will be a reduction of 16.798 basis points in the BANKEX. Hence, there is a negative relationship between the two variables. This is because an increase in one variable leads to a decrease in the other variable. It can also be noted that if there is no increase or decrease in the independent variable the mean of the dependent variable will be 37.87 points at that level. But since the repo rate can never be 0 the intercept in this case is insignificant to their relationship.

GRAPH -2: REGRESSION TREND LINE



A downward sloping trend line substantiates the above analysis that there is a negative relationship between the two variables of the study. The x-axis represents the repo rate or the X variable and the y-axis represents the change in BANKEX or the Y variable. The blue squares symbolise the change in BANKEX at a particular rate.

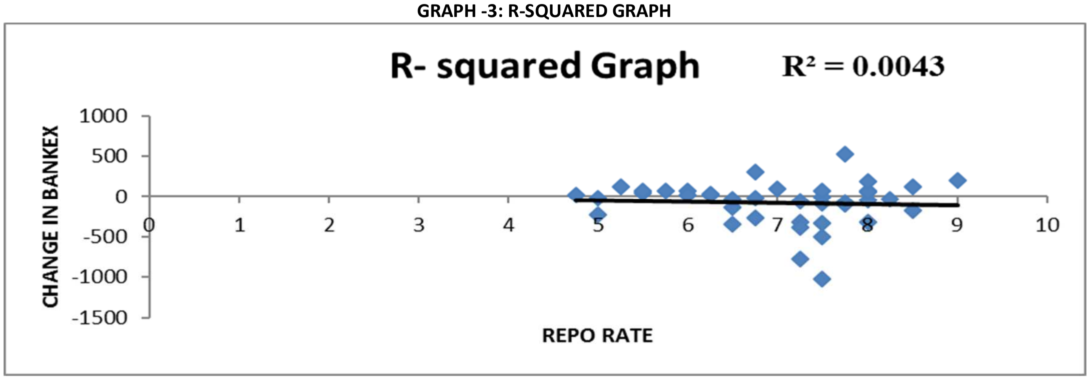
- **MARGINAL R- SQUARED**

The R-squared of the 2 variables for the study was = 0.0043 or 0.43%.

Analysis and Interpretation

This suggests that a change in variable X explains only 0.43% change in variable Y around its mean. Hence, a change in the repo rate explains only a 0.43% change in the BANKEX. Since this value is closer to 0 we can say that the model explains none of the variability of the dependent data around its mean. Therefore, there may be other variables which may have a significant impact on values of BANKEX and that change in repo rate does not explain the changes in BANKEX.

GRAPH -3: R-SQUARED GRAPH



Graph -3 is similar to that of the regression graph and interprets the same results but displays the r-squared value for the two variables. The low r-squared suggests that the independent variable is not a significant predictor of the dependent variable, and that there are other variables which explain the remaining predictability.

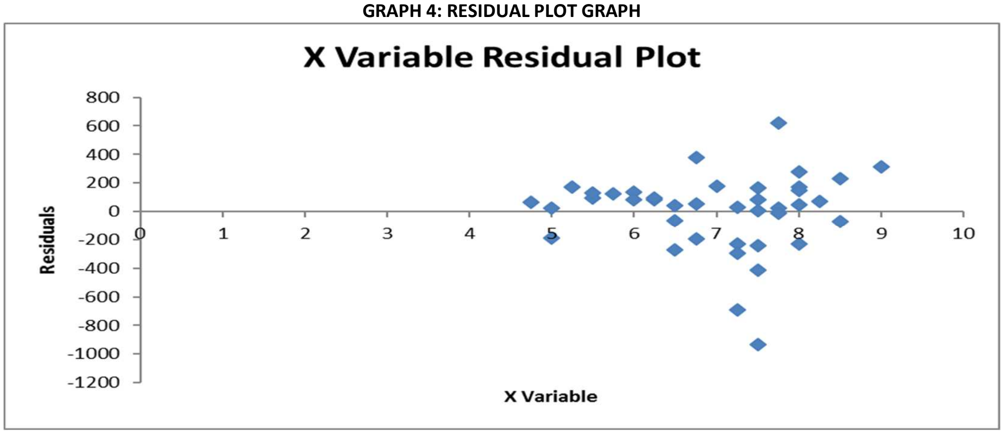
- **PATTERNED RESIDUAL PLOT**

The residual points for the data were calculated using the regression equation, which presents the expected value, and the actual results of the dependent variable.

TABLE 2: RESIDUAL PLOT TABLE

Observation	*Predicted Y*	*Residuals*	*Observation*	*Predicted Y*	*Residuals*
1	-75.5013	376.2413	21	-58.7044	125.3444
2	-83.8997	-688.58	22	-54.5052	93.20523
3	-88.0989	-933.441	23	-50.306	172.536
4	-92.2981	20.84808	24	-46.1068	25.03682
5	-96.4973	45.21728	25	-41.9076	64.04761
6	-92.2981	620.2681	26	-46.1068	-188.733
7	-88.0989	-413.921	27	-54.5052	131.1352
8	-83.8997	-230.32	28	-71.302	-66.968
9	-88.0989	-240.081	29	-88.0989	163.4189
10	-92.2981	-12.6919	30	-96.4973	148.2873
11	-96.4973	172.9873	31	-113.294	312.0441
12	-104.896	-68.0043	32	-104.896	227.7157
13	-100.696	68.64649	33	-96.4973	278.9473
14	-96.4973	-228.393	34	-88.0989	7.648871
15	-88.0989	83.67887	35	-83.8997	29.14967
16	-83.8997	-295.18	36	-79.7005	174.4505
17	-75.5013	53.40126	37	-75.5013	-197.079
18	-71.302	-270.178	38	-71.302	42.86205
19	-67.1028	81.80284	39	-67.1028	94.39284
20	-62.9036	134.5236	40	-62.9036	85.73364

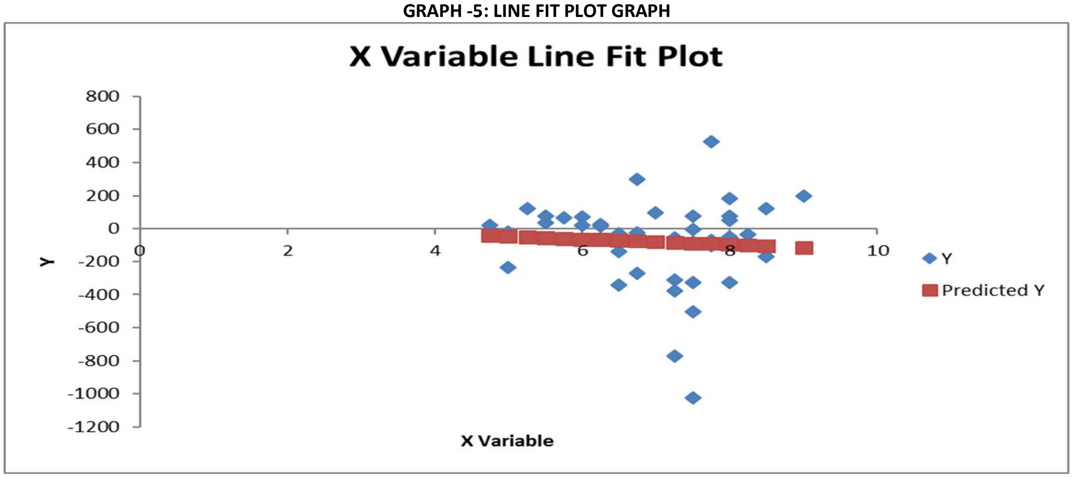
GRAPH 4: RESIDUAL PLOT GRAPH



Analysis and Interpretation

Graph -4 shows a definite pattern of the residuals, the value of the residual can be fairly predicted at any given point. Hence, there are other predictors in the Stochastic Error which can be used to predict the values of the dependent variable. Therefore, it can be concluded that the given predictor i.e. the change in repo rate is not the only predictor of the response, and the model is not explaining all the possibilities in the response. Additionally, since no clear outline or pattern can be observed in the residual plot, it is a sign that there are more variables to be studied than the one considered.

GRAPH -5: LINE FIT PLOT GRAPH

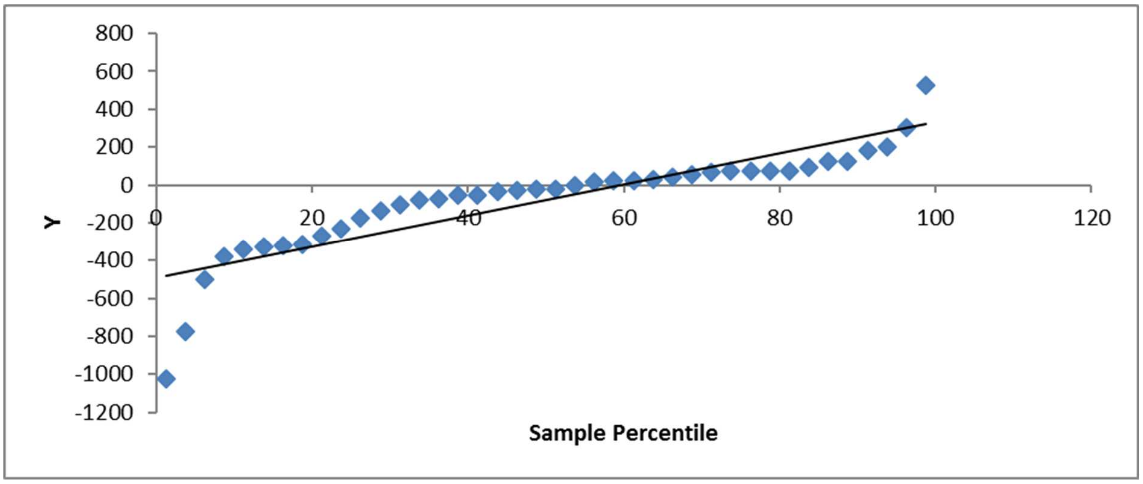


Graph -5 is another way to analyse the residual plot. As observed that the actual values of Y do not follow the pattern of predicted values of Y. This indicates that the independent variable cannot explain all the possibilities of the response and there are other factors governing the response values. This is also because there is a weak correlation between the predicted values and the actual values of the response.

- **NORMAL PROBABILITY PLOT**

The normal probability plot was created using the available data about the two variables. The plot was created to understand the values that lie outside the relevant range and may have an extreme impact on the data. The plotted chart is depicted in graph -6.

GRAPH -6: NORMAL PROBABILITY PLOT



Analysis and Interpretation

Graph -6 can be termed as a long tailed graph, which signifies that there is more variance in the data than can be expected in normal distribution. The graph also indicates a few extreme values (the points that shift away from the normal line), which indicate an abnormal impact on the values and cannot be defined without more information.

This plot suggests that more information is required to analyse the data and the given variable does not provide a normal distribution plot. It may also suggest that other tools are required to analyse the different variables involved.

FINDINGS OF THE STUDY

1. The study has proved that there is a negative relationship between the change in repo rate and the change in the BANKEX. The relationship was proved by a negative correlation and a negative slope of the regression equation. Therefore, when the repo rate rises the BANKEX falls. Hence, we can conclude that the repo rates have a negative effect on bank stocks.
2. A very small coefficient of determination and a random residual line fit plot shows that there are other variables which impact the BANKEX and in turn the bank stocks. It is also apparent that the impact of these variables is big enough to dwarf the impact of repo rate on bank stocks.
3. The economic theory suggests that if the repo rate changes, it will have a significant opposite change in the stock market, but this does not hold true for bank stocks in India. The impact is very negligent and shown that other factors are dominant.
4. The study also revealed that the value of the change in BANKEX cannot be determined by the repo rate. In turn, it means that the value of change or impact on bank stocks cannot be predicted by the repo rates. This is evident in the Residual line fit plot and Residual plot graph.
5. It is very much clear that there are some values of the dependent variable which lie outside the relevant range and show amplified results, which could mean that not all dependent values can be predicted with this model.

SUGGESTIONS

1. Due to a short span of the study, it was not possible to study all the variables which impact the dependent variable. Hence, to make a more informed decision it is required that all these variables are identified and studied in detail; there impact to be studied individually and in entirety.
2. To check for interdependence of the variables, the Durbin-Watson test can be used and the model can be studied in detail. This test will help in analysing any interdependent behaviour between the two variables and any other variable which may be used for an in-depth study of the model.
3. The same economic theory can be tested using variables from other industries and even in other markets. This is because different markets behave differently in many situations. For convenience, markets of economies at different development levels can also be studied in context of this model.

CONCLUSION

As mentioned above, the study suggests that there is a very weak or negligent relationship between the change in repo rate and bank stocks in India. The impact on the bank stock reflects that there are more apparent variables that have a stronger impact on them. Hence, the study suggests that these variables to be identified and studied in depth and their impact studied in detail. The stock markets in general are volatile and studying the market is much like studying human behaviour. Hence, a definite theory can never be suggested to predict the any pattern; as suggested by the random walk theory. This randomness of the market also makes it difficult for researchers to formulate a patter or a theory for the changes in the market. Therefore, the theory that a change in repo prices will lead to an inverse change in the market, may not hold true for bank stocks in the current scenario, with numerous factors showing their effect. Therefore, there is a lot of scope for researchers to analyse all such theories on the markets and test whether they hold true in the current scenario. A major reason for such volatility of the markets is also the opening up of domestic economies for the world, leading to globalization.

LIMITATIONS OF THE STUDY

- Since the study is based on the analysis of market data, which is very volatile in nature, it is difficult to give a definite analysis.
- The data available to conduct the study is mainly collected from secondary sources. Hence, the analysis can be very ideal or unrealistic in the absence of such valuable data. Due to this it is not possible to give a fair analysis, since the impact of the data which is not available for the study cannot be determined.
- There are various methods, through which BSE indexes are calculated like, price weighted calculation, market capitalization method etc. The calculation method is changed from time to time to represent the best value of the index depending upon the situation.

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APPENDIX/ANNEXURE

TABLE 3

BANKEX	Open	High	Low	Close	Repo
29-09-2015	19468.41	19995.50	19056.14	19769.15	6.75
02-06-2015	21426.68	21437.83	20596.47	20654.20	7.25
04-03-2015	23536.42	23656.72	22425.64	22514.88	7.5
15-01-2015	22094.75	22260.34	21832.61	22023.30	7.75
28-01-2014	12071.76	12251.02	11829.53	12020.48	8
29-10-2013	12303.09	12861.22	12182.25	12831.06	7.75
20-09-2013	12668.88	12740.50	11851.41	12166.86	7.5
03-05-2013	14497.82	14497.82	14150.15	14183.60	7.25
19-03-2013	13537.81	13562.97	13115.86	13209.63	7.5
29-01-2013	14694.38	14865.95	14561.53	14589.39	7.75
17-04-2012	12047.35	12248.28	11832.16	12123.84	8
25-10-2011	11092.30	11237.01	10707.05	10919.40	8.5
16-09-2011	11159.58	11222.46	10983.05	11127.53	8.25
26-07-2011	13018.94	13056.94	12648.99	12694.05	8
16-06-2011	12081.10	12223.61	12017.28	12076.68	7.5
03-05-2011	12785.75	12931.82	12353.80	12406.67	7.25
17-03-2011	12362.63	12516.29	12306.30	12340.53	6.75
25-01-2011	12691.23	12775.97	12317.24	12349.75	6.5
02-11-2010	14508.20	14611.43	14435.70	14522.90	6.25
16-09-2010	13579.05	13859.34	13563.82	13650.67	6
27-07-2010	11411.62	11517.96	11338.64	11478.26	5.75
02-07-2010	10624.91	10721.70	10624.91	10663.61	5.5
20-04-2010	10557.38	10737.52	10550.47	10679.61	5.25
19-03-2010	10453.26	10453.26	10400.71	10432.19	5
21-04-2009	5294.56	5423.13	5270.52	5316.70	4.75
05-03-2009	3963.06	3981.40	3698.65	3728.22	5
05-01-2009	5798.24	5885.80	5798.24	5874.87	5.5
08-12-2008	4926.12	4989.56	4762.21	4787.85	6.5
03-11-2008	5312.07	5417.66	5294.35	5387.39	7.5
20-10-2008	5643.93	5874.88	5525.36	5695.72	8
30-07-2008	6323.87	6548.54	6323.87	6522.62	9
25-06-2008	6352.99	6519.70	6261.63	6475.81	8.5
12-06-2008	6855.44	7072.43	6702.33	7037.89	8
31-01-2007	7340.54	7434.52	7205.45	7260.09	7.5
31-10-2006	6538.81	6595.53	6432.31	6484.06	7.25
25-07-2006	4474.55	4591.96	4473.40	4569.30	7
08-06-2006	4577.78	4577.78	4260.41	4305.20	6.75
24-01-2006	5110.34	5152.53	5075.62	5081.90	6.5
26-10-2005	4524.48	4574.29	4507.17	4551.77	6.25
31-03-2004	2970.07	3003.69	2952.24	2992.90	6

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