Research on Volatility Pattern of BSE BANKEX Index & BSE SENSEX Index using Exponential weighted moving Average Model

Renu Choudhary, Neha Jain

Abstract: India, a country with impressive growth prospects has stunned many developed nations. As far as performance of equity market concern, last 25 years among more than $1-trillion markets in the world, Indian equity market was best performer outpacing some of bigwigs such as US, Germany and Hong Kong. Last 25 years return in local money of SENSEX was so high in comparisons to others.

Banking sectors have specific and an important role in the economic development of a India. With the reconstitution of BSE Sensex in last few years, the weightage of the Banking, Financial Services and Insurance (BFSI) sector. In the BSE 30 will touch its all-time high level to 40.1% which will be more than the combined weights of technology as consumer and auto. The weightage of financials in the Sensex has more than doubled from financial year 2009. In the long duration index weightage affect portfolio in major funds. The main objective of this research paper is to show the volatility patterns of Bombay Stock Exchange SENSEX and BSE BANKEX Index using Exponential weighted moving average (EWMA) model.

Key Words: S&P BSE BANKEX, S&P BSE SENSEX, Volatility, EWMA

I. INTRODUCTION

A. S&P BSE SENSEX

The S&P BSE SENSEX also known as SENSEX is the benchmark index of the Bombay Stock Exchange (BSE) and India's most tracked bellwether index. SENSEX comprises of 30 stocks of those companies that are large in market capitalization, liquid and represents various sectors of economy of India. SENSEX the first stock index in India, started on 1st Jan, 1986. It is widely accepted index not only to observe the overall growth, development of particular sectors but also ups - downs of the Indian economy. The methodology used to evaluate the index is free float methodology. The sector-wise Free Float Market method of SENSEX is as under:

| S.N. | SENSEX/Sector | Free Float Market Capitalisation (%) |
|------|---------------|-------------------------------------|
| 1    | Finance       | 42.87                               |
| 2    | Information Technology | 13.71                         |
| 3    | Oil & Gas     | 11.08                               |
| 4    | FMCG          | 10.11                               |
| 5    | Transport Equipments | 7.86                          |
| 6    | Capital Goods | 4.79                                |
| 7    | Metal, Metal Products & Mining | 2.99                          |
| 8    | Power         | 2.52                                |
| 9    | Chemical & Petrochemical | 1.68                          |
| 10   | Healthcare    | 1.25                                |
| 11   | Telecom       | 1.14                                |

Source: https://www.bseindia.com/sensex/Indices Watch_Sector.aspx?iname=BSE30&index_Code=16

B. BSE BANKEX

Financial year 2002, was the turning point for banking in India mount on a major recovery in terms of both strength and soundness and profitability. In year 2002, return on assets in banking in India was become apparent than other economies of the world. India positioned at 27.5 as compared to Korea at 16.7, Thailand at 15.8 and Japan at 12.5 in the Financial Strength Index given by Moody Bank (2002). Similar to other growing economies in the world, India was also increasing sizable gains in expanding its consumer credit with tightening of credit administration procedures. Due to major policy decision of reducing interest rates, banks operational profits had significantly risen in FY 2002. In the same year, trading profits of banks (public sector) grown by Rs. 3749 crores and net profit was Rs. 8301 crores which was exceptionally high. The ordinance of Securitization Bill also enhances the chance of increase in profitability of banks by boosting up loan recoveries.

Revised Manuscript Received on February 06, 2020.

Dr Renu Choudhary, Associate Professor, Department of Information Technology & Management, IITM Janakpuri Institute of Information Technology & Management, New Delhi, India. E-mail: drenu_choudhary@yahoo.com

Dr Neha Jain, Assistant Professor, Department of Information Technology & Management, IITM Janakpuri Institute of Information Technology & Management, New Delhi, India. E-mail: smile.jain@gmail.com
All these policy decisions notably affected the performance of bank stocks. By seeing emergence of bank stocks as a major segment in the equity markets, BSE decided to constitute a separate index exclusively for bank stocks. On June 23, 2003, BSE set up an Index named as BANKEX consists of 12 stocks represents 90 percent of 90 percent of the total market capitalization of all banking sector stocks listed on BSE. The methodology used to evaluate the BANKEX index is free float methodology and base value taken is 1000 points.

**Table 2: Index Constituents of BANKEX**

| S.No. | Index constituents       |
|------|--------------------------|
| 1    | Axis Bank Ltd            |
| 2    | Bank of Baroda           |
| 3    | City Union Bank Ltd.     |
| 4    | Federal Bank Ltd         |
| 5    | HDFC Bank Ltd            |
| 6    | ICICI Bank Ltd           |
| 7    | IndusInd Bank Ltd        |
| 8    | Kotak Mahindra Bank Ltd  |
| 9    | State Bank of India      |
| 10   | Yes Bank Ltd             |

Source: https://www.bseindia.com/sensex/IndicesWatchWeight.aspx?iname=BANKEX&index_Code=53

**II. LITERATURE REVIEW**

Various researches have been accomplished from time to time not only to analyse behavior of SENSEX and Market Volatility but also Volatility and Forecasting of BSE BANKEX but very few research has been done on knowing the correlation between BSE BANKEX and BSE SENSEX. Alberg D et.al (2008) in their paper used GARCH model to evaluate return of mean and conditional variance of indices listed at Tel Aviv Stock Exchange (TASE). Results of these variance of conditional changing models were side by side compared with newer asymmetric models named GJR and APARCH. Outcomes revealed that for ascertaining conditional variance asymmetric GARCH model with fat-tailed densities gives better estimation as compared to GJR and APARCH models.

Reena et.al (2009) she inspected the various social, political and economic events that remarkably influenced the volatility of emerging stock markets.

Ramanarayanan (2011) applied asymmetric ARCH models to analyse the impact of positive and negative news on volatility in the Indian stock markets during the global financial meltdown of 2008-09. Past 10 year data of BSE500 stock index was taken to inspect the asymmetric volatility. Outcomes revealed that volatility is impacted more by negative news than positive news.

Manisha & Shikha (2014) studied the impact of macroeconomic factors on BSE BANKEX. Outcomes revealed that some of the economic factors such as exchange rate, GDP growth rate, and Inflation impact BANKEX positively and some like gold prices affect BANKEX negatively. Still none of the factor have significantly affect BANKEX.

B.Ramya (2014) he tried to give an empirical support to identify the volatility in sectoral indices and SENSEX. This paper conclude that there is noteworthy positive correlation between various sector indices BSE auto index, BSE bank index, BSE capital goods index, BSE consumer durables index, BSE FMCG index, BSE information technology index, BSE healthcare index, BSE metal index and BSE SENSEX.

Azeem, Sarfaraz (2017) analysed that whether the national and international markets index can influence the volatility of BSE BANKEX returns in India and also various factors that affects volatility of BSE BANKEX returns. The results shows that BANKEX returns are affected by both SENSEX returns as well as foreign market returns.

**III. OBJECTIVE OF THE STUDY**

The prime objective of this research paper is to model the volatility patterns of Bombay Stock Exchange (BSE) SENSEX and BSE BANKEX Index using EWMA model.

**IV. RESEARCH METHODOLOGY**

EWMA model is used to investigate the Co-relation between Bombay Stock Exchange (BSE) BANKEX Index volatility patterns & SENSEX. The Exponentially Weighted Moving Average (EWMA) is the statistic for monitoring the process that averages the data in such a way that gives less weight to the data as they are further removed in time.

**V. LIMITATIONS OF THE STUDY**

In the study, it has been assumed that economic condition of India remained constant and has no bearing on the movement of the BSE SENSEX and BANKEX. Also, impact of the external factors remained neutral on both BSE SENSEX and BANKEX.
VI. DATA ANALYSIS

Table 3: Volatility Pattern of BSE BANKEX

| Year | Bankex open | smoothed | forecasted | Residue | Alpha |
|------|-------------|----------|------------|---------|-------|
| 2008 | 11440.69    | 3470.426 | 9001.567   | -5531.14| 0.3   |
| 2009 | 5497.61     | 1687.502 | 6974       | -7986.5 | 0.3   |
| 2010 | 10066.6     | 3058.139 | 10912.32   | -7854.18| 0.3   |
| 2011 | 13457.99    | 4075.616 | 9674       | -8292.61| 0.3   |
| 2012 | 9212.56     | 2801.987 | 12229.69   | -9427.71| 0.3   |
| 2013 | 14434.14    | 4368.461 | 16321.93   | -11953.5| 0.3   |
| 2014 | 13042.38    | 3950.933 | 17954.34   | -14003.4| 0.3   |
| 2015 | 21489.27    | 4368.461 | 24796.32   | -18517.4| 0.3   |
| 2016 | 19331.38    | 5887.633 | 28790.15   | -20114.9| 0.3   |

Source: bseindia.com

In Table 3, we are able to present the statistics of volatility pattern of BSE BANKEX which clearly shows that in the 10 years from the year 2008 to 2018 it goes in ascending order (increasing) whereas the pattern follows the forecasting 9001.567 to 28790.15 (with respect to alpha value 0.3). Here the residue is also on the higher site shows that high fluctuation in the BSE BANKEX.

![Figure 1: Volatility Pattern of BSE BANKEX](image)

Table 4: Volatility Pattern of BSE SENSEX

| Year | Sensex Open | smoothed | forecasted | Residue | Alpha = 0.3 |
|------|-------------|----------|------------|---------|-------------|
| 2008 | 20325.27    | 4790.145705 | 15839.75667 | -11049.6 | 0.3         |
| 2009 | 9720.55     | 4819.779705 | 15938.53667 | -11118.8 | 0.3         |
| 2010 | 17473.45    | 5401.191705 | 17876.57667 | -12475.4 | 0.3         |
| 2011 | 20621.61    | 5605.191705 | 18556.57667 | -12951.4 | 0.3         |
| 2012 | 15534.67    | 5665.249705 | 18756.77    | -13091.5 | 0.3         |
| 2013 | 19513.45    | 6860.359705 | 22740.47    | -15880.1 | 0.3         |
| 2014 | 21222.19    | 7519.164705 | 24936.48667 | -17417.3 | 0.3         |
| 2015 | 27485.77    | 8068.607005 | 26766.14    | -18698.1 | 0.3         |
| 2016 | 26101.5     | 8725.482705 | 28957.54667 | -20232.1 | 0.3         |
| 2017 | 26711.15    | 9153.889705 | 30385.57    | -21231.7 | 0.3         |
| 2018 | 34059.99    | 10256.21571 | 34059.99    | -23803.8 | 0.3         |

Source: bseindia.com
In table 4, we are able to present the statistics of volatility pattern of BSE SENSEX which clearly shows that in the 10 years from the year 2008 to 2018 it goes in ascending order (increasing) whereas the pattern follows the forecasting 15839.75667 to 34059.99 (with respect to alpha value 0.3). Here the residue is also on the higher site shows that high fluctuation in the BSE SENSEX. BSE SENSEX is very high in value in comparison of BSE BANKEX but both are increasing in same direction which shows perfect positive correlation between them.

In table 5, we are able to present the statistics of volatility pattern of difference between BSE BANKEX & BSE SENSEX which clearly shows that in the 10 years from the year 2008 to 2018 it goes in descending order (decreasing) whereas the individual pattern are increasing which indicate that in long duration pattern will be closely similar of BSE BANKEX & BSE SENSEX. The forecasting 6838.19 to 5269.84 (with respect to alpha value 0.3). Here the residue is also on the lower site shows that low fluctuation in the difference of BSE BANKEX & BSE SENSEX.
VI. CONCLUSION

The major objective of this research paper is to model the volatility patterns of Bombay Stock Exchange (BSE) SENSEX and BSE BANKEX Index using EWMA model. S&P BSE BANKEX index moment of last 10 years represents also the great attractions of investors and the high volume of turnovers. EWMA model fitted well on BANKEX financial series and SENSEX series. The actual difference between Minimum and Maximum reveals in high degree of volatility in Bombay Stock ExchangeIs used for open ended stocks in market. We considered data ranging from 2008 to 2018. Basic statistics shows the mean and risk value in the BANKEX index (0.2013). The returns are over 17 times in 10 years and BANKEX index have absorbed the global financial crisis well. The stock value generally fluctuate is considered abnormal and highly volatile since the data presence in year 2008 for down effect shocks and 2009 for positive shocks.

REFERENCES

1. Aggarwal R, Inclan C, and Leal R (1999). Volatility in emerging stock markets, “Journal of Financial and Quantitative Analysis”, 34(01): 33-55.
2. Alberg D, Shalit H, and Yosef R (2008). Estimating stock market volatility using asymmetric GARCH models, “Applied Financial Economics”, 18(15): 1201-1208.
3. Azeem Ahmad Khan, Sarfaraz Javed (2017), “A study of volatility behaviour of S&P BSE BANKEX return in India: A pragmatic approach using GARCH model”, “International Journal of Advanced and Applied Sciences”, Vol-4, Issue 4, pp. 127-132.
4. B. Ramya (2014), “A Study on stock market return and volatility analysis between SENSEX with sectoral indices of Bombay Stock Exchange”, “EPRA International Journal of Economics and Business Review”, Vol-2, Issue-11.
5. Chand S, Kamal S, and Ali I (2012), Modelling and volatility analysis of share prices using ARCH and GARCH models, “World Applied Sciences Journal”, 19(1): 77-82.
6. Goudarzi H and Ramanarayanan CS (2011) “Modeling asymmetric volatility in the Indian stock market”, “International Journal of Business and Management” 6(3): 221-231
7. Manisha Luthra and Shikha Mahajan (2014), “Impact of Macro factors on BSE Bankex”, “International journal of Current Research and Academic Review”, Vol-2, Number 2, pp.179-186.
8. https://www.bseindia.com/sensex/IndicesWatch_Sector.aspx?name =BSE30&index Code=16
9. 9.https://www.bseindia.com/sensex/IndicesWatch_Weight.aspx?iname = BANKEX & index Code =53
10. economictimes.indiatimes.com/articleshow/62548896.cms?utm_source = contentofinteres & utm_medium=text&utm_campaign=cpst
11. https://www.thehindubusinessline.com/markets/banking-sector-gains-sensex-weight-from- monday/article9994761.ece

AUTHORS PROFILE

Dr. Renu Choudhary, having Ph.D with over 18 years of academic experience in graduate and post graduate programs in reputed business schools in Accounting, taxation & Law area. Also a member of Institute of Company Secretaries of India. Have presented papers in several national and international conferences. More than 14 papers have been published in journals of national and international repute.

Dr. Neha Jain, PhD from state university having 14 years of teaching experience along with 8year of research experience in reputed institute. 12 research papers are published in international journals and 5 published in UGC approved national journals. I have presented and published several papers in international and national conferences.