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

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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:

Table 1: Sector-wise Free Float Market Capitalization of SENSEX

S.No	SENSEX/Sectors	Free Float Market Capitalisation (%)
	S&P BSE SENSEX	100
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.

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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/Indices Watch_ Weight.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 (20**1**4) 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 (20**1**4) 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 (20**17)** 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-orelation 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	Residule	Alpha
2008	11440.69	3470.426	9001.567	-5531.14	0.3
2009	5497.61	1687.502	9674	-7986.5	0.3
2010	10066.4	3058.139	10912.32	-7854.18	0.3
2011	13457.99	4075.616	12368.23	-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	6485	20541.04	-14056	0.3
2016	19331.38	5837.633	22974.67	-17137	0.3
2017	20802.48	6278.963	24796.32	-18517.4	0.3
2018	28790.15	8675.264	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 **forcasing** 9001.567 to 28790.15 (with respect to alpha value 0.3). Here the residule is also on the higher site shows that high fluctuation in the BSE BANKEX
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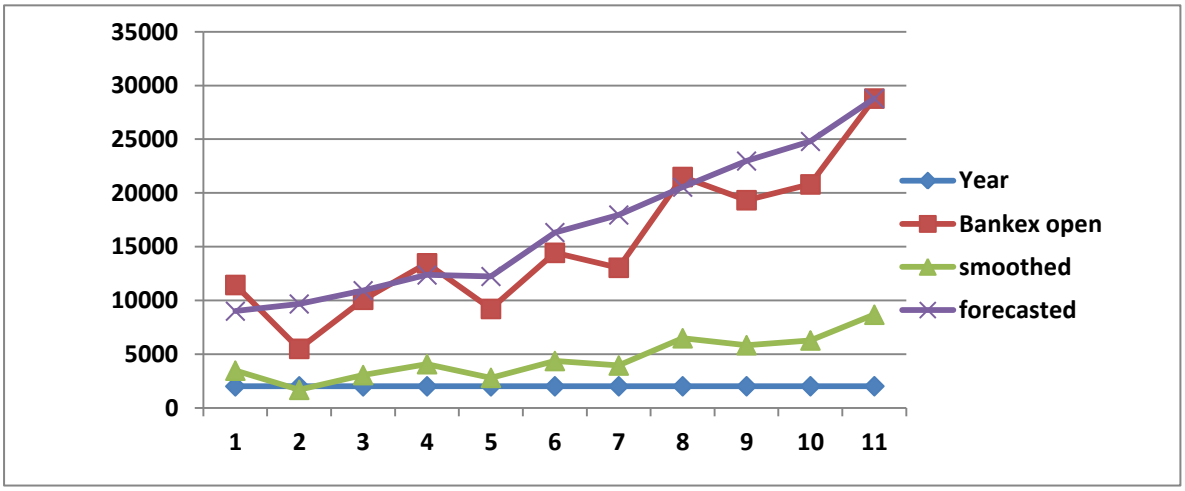

Figure 1: Volatility Pattern of BSE BANKEX

Table 4: Volatility Pattern of BSE SENSEX

Year	Sensex Open	smoothed	forecasted	Residule	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	8068.060705	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 **forcasing** 15839.75667 to 34059.99 (with respect to alpha value 0.3). here the residule is also on the higher site shows that high fluctuation in the BSE SENSEX. BSE SENSEX is very high in value in comparision of BSE BANKEX but both are increasing in same direction which shows perfect positive correlation between them.

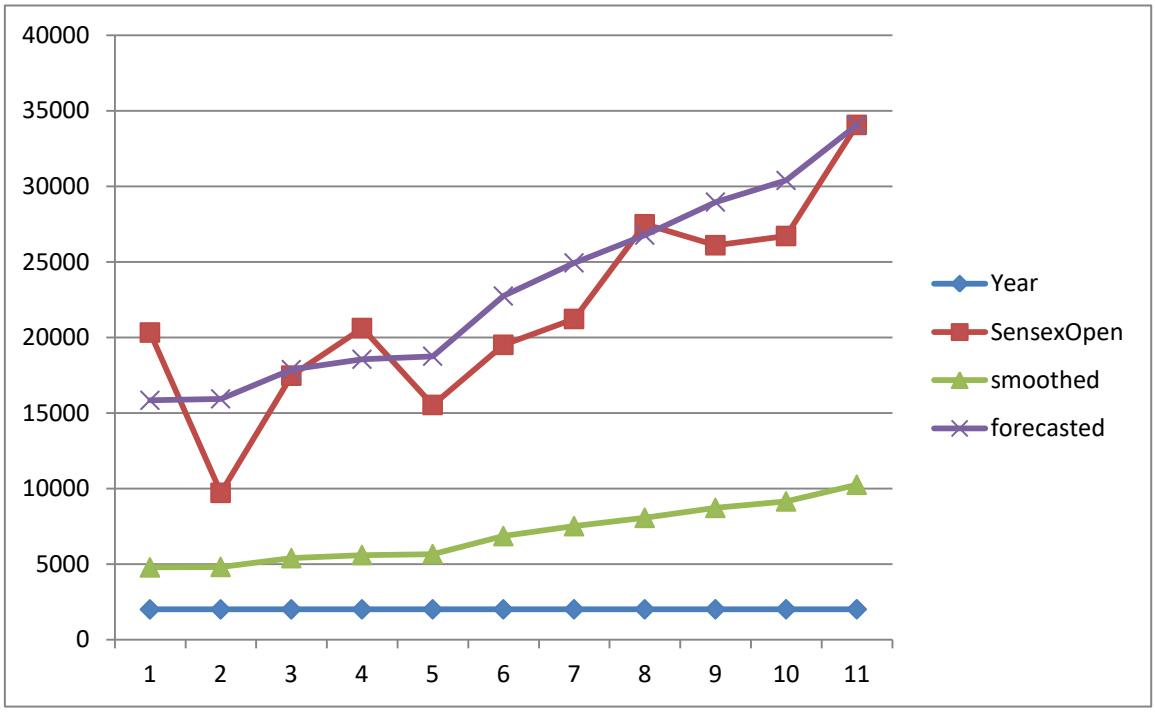

Figure 2: Volatility Pattern of BSE SENSEX

Table 5: Volatility Pattern of BSE SENSEX & BANKEX

Year	Sensex Open	Bankex open	Difference	smoothed	forecasted	Residule	Alpha = 0.3
2008	20325.27	11440.69	8884.58	2089.675705	6838.19	-4748.51	0.3
2009	9720.55	5497.61	4222.94	1917.579705	6264.537	-4346.96	0.3
2010	17473.45	10066.4	7407.05	2127.496705	6964.26	-4836.76	0.3
2011	20621.61	13457.99	7163.62	1894.722705	6188.347	-4293.62	0.3
2012	15534.67	9212.56	6322.11	1996.341705	6527.077	-4530.73	0.3
2013	19513.45	14434.14	5079.31	1963.780705	6418.54	-4454.76	0.3
2014	21222.19	13042.38	8179.81	2132.861705	6982.143	-4849.28	0.3
2015	27485.77	21489.27	5996.5	1905.747705	6225.097	-4319.35	0.3
2016	26101.5	19331.38	6770.12	1833.081705	5982.877	-4149.79	0.3
2017	26711.15	20802.48	5908.67	1714.995205	5589.255	-3874.26	0.3
2018	34059.99	28790.15	5269.84	1619.170705	5269.84	-3650.67	0.3

Source: Author's own creation

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 **forcasing** 6838.19 to 5269.84 (with respect to alpha value 0.3). Here the residule is also on the lower site shows that low fluctuation in the difference of BSE BANKEX & BSE SENSEX.

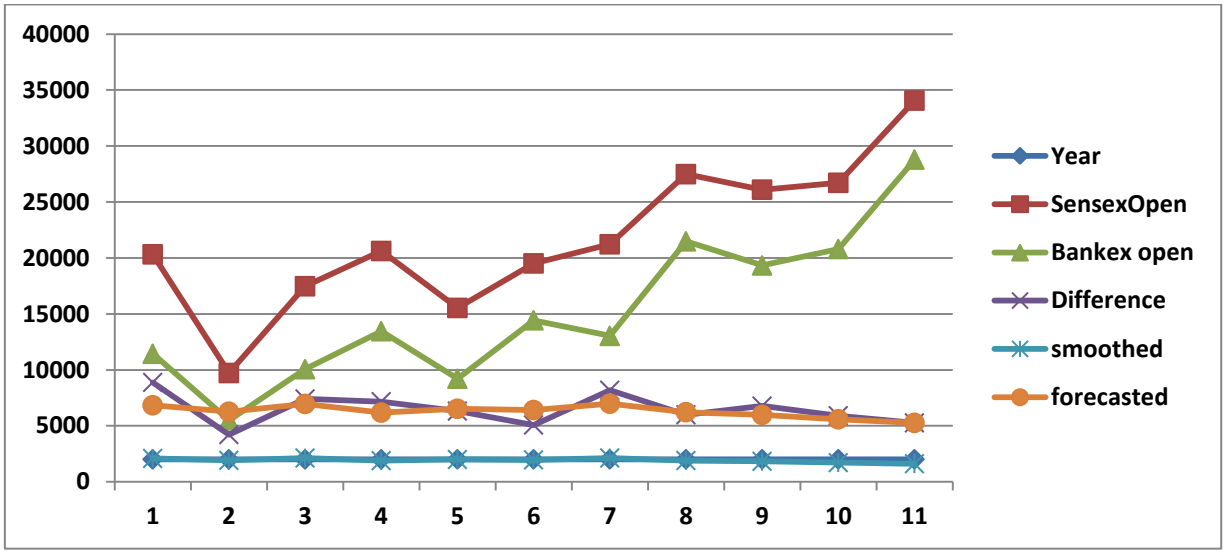

Figure 3: Volatility Pattern of BSE SENSEX & BANKEX

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.

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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.

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