Quantative Comparison of The Two Stock Exchanges NSE & BSE

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Abstract— This paper deals with the comparison between the domestic and international stockexchange with reference to BSE and NASDAQ as these stock exchanges are very renowned andhas a huge customer base. The two exchanges are compared on the basis of qualitative as well asquantitative factors on the basis of historical data of the exchanges for the financial year 2019-20,2020-21, and 2021-22.The data collection was the crucial and challenging part of this study however; all the data used inthe projects are taken from the authentic websites, monthly report of the exchanges, etc. and areaccurate to the extent possible.In case ofIndian stock exchange, it is interesting to note that the Sensex has multiplied 560 times since itsinception with 1979 as the base year. By averaging around 15% CAGR during the last 42 years,Sensex has rewarded long term investor handsomely. Similarly, in case of US stock exchange,indices such as NASDAQ-100 Index, NASDAQ Biotechnology Index, NASDAQ CompositeIndex, ABA Community Bank NASDAQ Index have shown a rise of +684.80%, +440.40%,+711.19%, +121.86% respectively since inception till 2003. This project can help exchanges in recognizing their loopholes and can be used for furtherstudy.

Indexed Terms— Market Capitalization,Listing agreements,Settlement

I. INTRODUCTION

In this era of 21st century, people all over the world not just want to keep their money safe but to make money out of money by taking calculated risk. Thus, they are heading towards such an investment option which can help them in enhancing the amount of their wealth in short period as well as long of time. One such investment option is investing in stock market. The stock market facilitates benefits to its investors by providing opportunity to get share in the profits of publicly-traded companies as some stocks pay regular dividends and the investor can also profit by selling their stock for a profit if the stock price increases from their purchase price. In case of Indian stock exchange, it is interesting to note that the Sensex has multiplied 560 times since its inception with 1979 as the base year. By averaging around 15% CAGR during the last 42 years, Sensex has rewarded long term investor handsomely. Similarly, in case of US stock exchange, indices such as NASDAQ-100 Index, NASDAQ Biotechnology Index, NASDAQ Composite Index, ABA Community Bank NASDAQ Index have shown a rise of +684.80%, +440.40%,+711.19%, +121.86% respectively since inception till 2003. Therefore, due to all such advantages the stock market is witnessing heightened activities and is increasingly gaining importance.

The study pertains to comparative analysis of the Bombay Stock Exchange and the NASDAQ Stock Exchange. Globalization of the world economy has led to the creation of single market in the world. The growth and integration of the capital markets is one of the engines of globalization. After globalization, many stock exchanges have removed restrictions and admitted listing of shares in more than one exchange, which may be either in domestic market or international market. The national stock exchanges are moving towards increasing linkages to other international stock exchanges and the reason behind the same is advancement in technology, globalization, growing competition, institutionalization, etc. There are two aims of stock market integration:

1. To increase the depth and liquidity of stock exchanges and that would permit them to compete more effectively.
2. To provide investors in one country, an opportunity to buy and sell without restriction, equities that are issued in another country at the same price after adjustment for foreign exchange rates. Therefore, it is very important to have thorough knowledge of both Indian stock market and international stock market and their similarities and is similarities before going to invest in cross-border market, here studied with

reference to Bombay Stock Exchange and the NASDAQ Stock Exchange.

The BSE and the NASDAQ stock exchange have been carefully chosen because the BSE is the oldest stock market in India and the majority of trading in Indian market is done on Bombay Stock Exchange. As of November 2021, the BSE had 5,565 listed firms. And 105,908,363 investors are trading on Bombay Stock Exchange as of 17 May 2022. Similarly, NASDAQ stock market began operation as the world's first electronic stock market as on February 8, 1971, its technology powers more than 70 marketplaces in 50 countries, and 1 in 10 of the world's securities transactions. Number of listings in NASDAQ is 3,554 and there are more than 10,000 corporate clients. The NASDAQ is the second largest stock exchange on earth.

Significance of the study

- It will help the investors to understand the differences and relation between Indian Stock Exchange and its international counterpart.
- It will help the exchanges in finding loopholes, if any.
- It will serve as a baseline for future researchers.

II. LITERATURE REVIEW

1. Debjiban Mukherjee (April 2007) has conducted a research on "Comparative Analysis of Indian Stock Market with International Markets". The stock market is witnessing heightened activities and is increasingly gaining importance. In the current context of globalization and the subsequent integration of the global markets this paper captures the trends, similarities and patterns in the activities and movements of the Indian Stock Market in comparison to its international counterparts. This study covers New York Stock Exchange (NYSE), Hong Kong Stock Exchange (HSE), Tokyo Stock Exchange (TSE), Russian Stock Exchange (RSE), Korean Stock Exchange (KSE) from various socio-politico-economic backgrounds. Both the Bombay Stock Exchange (BSE) and the National Stock Exchange of Indian Limited (NSE) have been used in the study as a part of Indian Stock Market. The time period has been divided into various eras to test the correlation between the various exchanges to prove that the Indian markets have become more integrated with its global counterparts and its reaction are in tandem with that are seen globally.
2. Ms.BinalPrajapat and Ms.Bhoomi Patel (April 2018) have conducted a research on "Stock Market Volatility: Comparative study between India and US. The global market is having its influence on Indian stock market. The impact of developed country effect, particularly, that of US stock market, has been the most prominent. Therefore, the objective of this study is to determine he trend in volatility in BSE Sensex Vis a NYSE Composite. Period chosen for study is 2012 to 2017 monthly data for respective stock exchange. Research design is Descriptive using Eview Software the Unit root test, GARCH & ARCH Model. The result of the Unit root test which gives an idea about whether the data follows trend or not. The output states that all the variables become non stationary at the level only, so that suggests that data does follow any trend at level. The model used for measuring the volatility was GARCH (1, 1) because it was well significant as compared to the other models, because it has highest probability and fulfills all the criteria of selection as compared to other variables. The GARCH (1, 1) model which undertakes the variables i.e. are Logbse and Lognew which are the selected stock market, the output of model states that the indices has presence of volatility in the stock market that can be stated through the ARCH and GARCH term which are significant to explain the model.
3. BorissSiliverstovs (June 2006) has conducted a research on "The Stock Market and Investment". This paper investigates the relation between equity prices and aggregate investment in major European countries including France, Germany, Italy, the Netherlands and the United Kingdom. Increasing integration of European financial markets is likely to result in even stronger correlation between equity prices in different European countries. This process can also lead to convergence in economic development across European countries if developments in stock markets influence real economic components, such as investment and consumption. Indeed, our vector autoregressive models suggest that the positive correlation

between changes equity prices and investment is, in general, significant. Hence, monetary authorities should monitor reactions of share prices to monetary policy and their effects on the business cycle.

III. RESEARCH METHODOLOGY

For the comparative analysis of Bombay Stock Exchange and NASDAQ Stock Exchange, the period chosen is from 1st April 2019 to 31st March 2022. The period is divided into different sets of year such as 2019-20, 2020-21 and 2021-22, in order to capture the effect and movement of stock exchanges with each other during different periods. Both qualitative and quantitative analysis has been used to conduct the comparative study. Statistical techniques such as correlation, mean, etc. have been used.

Data Analysis and Interpretation
Quantitative analysis

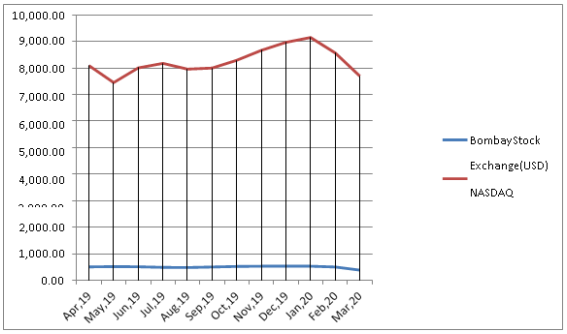
The hypothesis that the exchanges impact each other has been tested through various statistical methods with data on price, return collected from the exchanges. Mainly the correlation analysis and the return analysis have been used to validate the hypothesis.

1. Price Relationship

Correlation is a statistical measure that expresses the extent to which two variables are linearly related (meaning they change together at a constant rate). But it has limitations too, it doesn't tell us about cause and effect. Correlation also cannot accurately describe curvilinear relationships. The numerator of the above formula is also a measure of association between two variables X and Y which is called the covariance between X and Y. Similar to correlation, a covariance is a single number that measures the strength of the linear relationship between two variables. It is by looking at the sign of the correlation or the covariance, i.e. positive or negative, that we can tell whether the two variables are positively or negatively related.

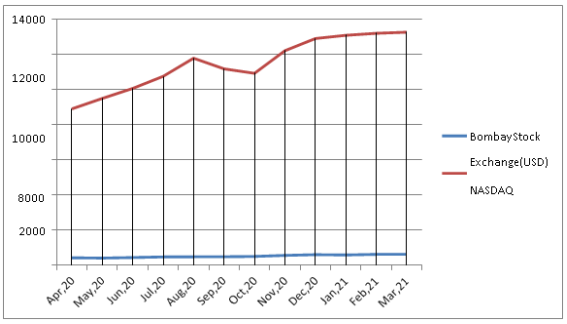
Therefore, the correlation is better because, unlike the covariance, the correlations are not affected by the units in which the variables are measured. All the correlations are between +1and-1, inclusive. The sign determines whether the relationship is positive or negative. The strength of the relationship is measured by the absolute value or the magnitude of the correlation. The closer it is to +1 the stronger the relationship is and the closer to zero indicates that there is practically no linear relationship. At extreme a correlation equal to +1 or -1 occurs only when the linear relationship is perfect. In this part the price data of the BSE and NASDAQ are collected and subject to correlation test in order to find out the influence that they have on each other. In other words, an effort has been made to gain insight into how far the price movements of the exchanges are related with one another.

Time series plot of Close_BSEandClose_NASDAQ – F.Y-2019-20 (in USD)



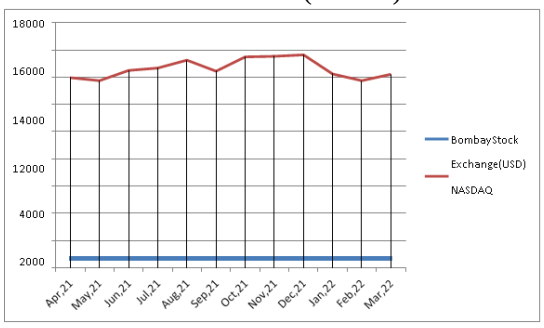
Comment: The above graph shows the month-wise closing price of BSE and NASDAQ in the financial year 2019-20. In the financial year 2019-20, NASDAQ has reached its highest closing price in the month of January, 2020 i.e., $9,150.94 and similarly, it experienced the lowest closing price in the month of May, 2019 i.e., $7453.15. Moreover, it started rising towards its highest point from September, 2019 and started declining after January,2020. However, BSE has not shown much fluctuation in its closing price in this financial year but it experienced its lowest closing price in the month of March, 2020.

Time series plot of Close_BSEandClose_NASDAQ– F.Y.2020-21(in USD)



Comment: Above graph shows the month-wise closing price of BSE and NASDAQ in the financial year 2020-21. In this year NASDAQ shows the increasing trend in its closing price and reached to the highest level of $13,246.87 in the month of March, 2021. It started rising from April, 2020, shows a declining phase from August, 2020 to October, 2020 and against arted rising after October, 2020 onwards. Taking BSE into consideration it also shows an increasing trend but at a slightly low rate but it also reached its highest closing price in the month ofMarch,2021i.e., $ 638.82.

Time series pilot of Close_BSEandClose_NASDAQ –F.Y.-2021-22(in USD)



Comment: Above graph shows a month-wise closing price of BSE and NASDAQ for the financial year 2021-22. In this year, closing price of NASDAQ keeps on fluctuating constantly and reached its highest level in the month of December,2021 i.e., $15,644.97. Talking about BSE showed a slight fluctuation just like past two years. However, it reached its highest closing price among all the three years in the month of October, 2021 i.e., $765.24.

Computation of Correlation

Correlation between BSE and NASDAQ for the financial year 2019-20 (in USD)

Months	BSE	NASDAQ	a	b	ab	a^2	b^2
Apr,19	503.47	8,095.39	6.55	-158.05	-1035.21656	42.9025	24979.2746
May,19	512.27	7,453.15	15.35	-800.29	-12284.4259	235.622	640461.411
Jun,19	508.15	8,006.24	11.23	-247.20	-2776.03725	126.1129	61107.0144
Jul,19	483.47	8,175.42	-13.45	-78.02	1049.346539	180.9025	6086.85982
Aug,19	481.56	7,962.88	-15.36	-290.56	4462.975949	235.9296	84424.1431
Sep,19	498.77	7,999.34	1.85	-254.10	-470.08191	3.4225	64565.9613
Oct,19	517.62	8,292.36	20.7	38.92	805.678569	428.49	1514.8964
Nov,19	526.20	8,665.47	29.28	412.03	12064.2873	857.3184	169770.097
Dec,19	532.13	8,972.60	35.21	719.16	25321.6824	1239.744	517193.508
Jan,20	525.29	9,150.94	28.37	897.50	25462.12238	804.8569	805509.248
Feb,20	494.00	8,567.37	-2.92	313.93	-916.680476	8.5264	98553.0934
Mar,20	380.11	7,700.10	-116.81	-553.34	64635.45033	13644.58	306183.307
	Mean=496.92	Mean=8253.43833			116319.1014	17808.4	2780348.81

Correlation=116319.1014√(17808.4*2780348.81)=0.522744

Correlation between BSE and NASDAQ for the financial year 2020-21(in USD)

Months	BSE	NASDAQ	a	b	ab	a^2	b^2
Apr,20	435.06	8,889.55	-93.717	-2,580.	241793.8866	8782.97	6656550.67

			5	03			
May,20	418.37	9,489.87	-110.408	-1,979.71	218574.7435	12189.82	391924 8.52
Jun,20	450.52	10,058.77	-78.2575	-1,410.81	110406.401	6124.236	199038 2.6
Jul,20	485.24	10,745.27	-43.5375	-724.31	31534.61179	1895.514	524623 .817
Aug,20	498.42	11,775.46	-30.3575	305.88	-9285.77639	921.5778	93563. 0638
Sep,20	491.19	11,167.51	-37.5875	-302.07	11354.02606	1412.82	91245. 8016
Oct,20	511.14	10,911.59	-17.6375	-557.99	9841.534515	311.0814	311351 .947
Nov,20	569.66	12,198.74	40.8825	729.16	29809.91641	1671.379	531675 .472
Dec,20	616.14	12,888.28	87.3625	1,418.70	123941.2486	7632.206	201271 1.96
Jan,21	597.23	13,070.69	68.4525	1,601.11	109600.037	4685.745	256355 5.79
Feb,21	633.54	13,192.35	104.7625	1,722.77	180481.7759	10975.18	296793 9.23
Mar,21	638.82	13,246.87	110.0425	1,777.29	195577.5229	12109.35	315876 2.59
	Mean= 528.778	Mean= 11469.5792			125362 9.928	68711.88	248216 11.5

Correlation=169840.015/√ (22028.57*5368050.02)
=0.4938995

SUMMARY

YEAR	CORRELATION	REMARKS
2019-20	0.522744	1>0.5≥0,itindicates alow positivecorrelation.
2020-21	0.9599275	1>0.9≥0,it indicatesahigh positivecorrelation.
2021-22	0.4938995	1>0.4≥0,itindicates alow positivecorrelation.

Comment: Hence, it can be observed that both the BSE and the NASDAQ moves in the same direction since, they have positive correlation in all the three financial years however, magnitude of their movement keeps on changing. Thus, it can be concluded that both the exchanges are integrated and will be impacted by each other activities.

2. Returns

Risk and returns are the two factors investors look at before investing in any stock exchange. Therefore, this section tries to compare the return facilitated by BSE and NASDAQ over a period of time.

Table showing returns of BSE and NASDAQ.

CALENDERYEAR	BSE	NASDAQ
2022	18%	-9.10%
2021	68%	21.39%
2020	-24%	43.64%
2019	17%	35.23%
2018	11%	-3.88%
2017	17%	28.24%
2016	-9%	7.50%
2015	25%	5.73%
2014	19%	13.40%
2013	8%	38.32%

AveragereturnofBSEoveraperiodof10years =15%

Average return of NASDAQ over a period of 10years =18.047%

Comment: Therefore, it can be observed that NASDAQ has provided more return as compared to BSE, over a period of 10years. However, high volatility can be observed in returns provided by the NASDAQ in individual years.

RESULTS AND DISCUSSION

The main findings of the study are as follows:

1. In terms of market capitalization, NASDAQ has a better position as compared to BSE. The market capitalization of NASDAQ is US $18.9 trillion more than that of BSE.
2. In terms of number of listed securities, both the BSE and NASDAQ show an increasing trend, however, NASDAQ increases at a higher rate than BSE.
3. In terms of listing agreement, the listing agreement of NASDAQ is more complex and lengthy in comparison with BSE.
4. In terms of circuit filter, circuit filter of BSE is more precise and elaborated – all the trigger points, halt duration and pre-opening session have been properly defined.
5. Taking settlement cycle of both the exchanges into consideration, we found the settlement cycle of BSE (i.e.,T+2) is better than the settlement cycle of NASDAQ (i.e.,T+3) as it takes less time to settle the trade.
6. By analyzing the price relationship of both the exchanges under study, we found that the closing price of BSE as well as NASDAQ show almost similar trend in all the three financial year taken into consideration. For e.g. in F.Y 2019-20 both the BSE and NASDAQ shows an increasing trend and reaches its lowest point in the month of March, 2020.
7. By computing correlation between the BSE & NASDAQ for all the three financial year we found that both the BSE and NASDAQ are correlated and integrated.
8. By taking returns of both the exchanges into consideration from the calendar year 2013 to 2022, we observe that the average return of NASDAQ (i.e., 18.047%) over a period of 10 years is more than that of BSE.

Thus, the study reveal that both the BSE and NASDAQ is better than each other in some field or the other and both are correlated and moves in a same direction and have a cause and effect relationship.

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