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To Study the Comparison between World Top 10 Stock Market

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Abstract: ***This study provides a comprehensive comparative analysis of the world's top 10 stock markets, spanning the period from 2018 to 2023. Through exploratory research design and data collection from secondary sources, the study examines the performance, volatility, and trends of key indices and stocks from major exchanges worldwide. Utilizing tools such as correlation analysis and stationarity tests, the study evaluates the interconnectedness and stability of these markets. Findings reveal high positive correlations among some of the exchanges while highlighting differences in volatility and risk levels. Moreover, ARCH and GARCH models are employed to assess the volatility of specific indices, shedding light on the impact of various factors on market dynamics. Overall, the study offers valuable insights for investors, policymakers, and financial analysts into the distinct characteristics and trends of the world's leading stock markets.***

Keywords: Stock market, volatility, risk assessment, investors, ARCH and GARCH models

1. Introduction

The stock market, also known as the equity market or share market, facilitates the buying and selling of stocks, representing ownership in businesses. Investors analyze stocks through fundamental and technical analysis to make informed decisions. The global stock market serves as a vital platform for businesses to raise capital and for investors to seek opportunities for wealth accumulation and portfolio diversification. With the emergence of interconnected financial systems and advancements in technology, understanding the dynamics and nuances of different stock markets has become increasingly important for investors, policymakers, and financial analysts. This study aims to provide a comprehensive comparative analysis of the world's top 10 stock markets, encompassing a range of factors such as market size, liquidity, regulatory environment, trading mechanisms, and historical performance. By examining these key aspects, we seek to uncover insights into the unique characteristics and strengths of each stock exchange, as well as identify potential areas for improvement and opportunities for international collaboration. Fundamental analysis evaluates a company's financial health, while technical analysis examines market data to predict price trends. The world's top stock exchanges include the New York Stock Exchange (NYSE), NASDAQ, Tokyo Stock Exchange, Shanghai Stock Exchange, Hong Kong Stock Exchange, London Stock Exchange, Euronext, Shenzhen Stock Exchange, Toronto Stock Exchange, and Deutsche Börse. Each exchange has its own history, regulations, and significance in the global economy. For example, the NYSE is the largest stock exchange globally by market capitalization, while the Tokyo Stock Exchange is Japan's primary exchange. Similarly, the London Stock Exchange is one of the oldest exchanges, and Euronext spans multiple European countries. Overall these exchanges play crucial roles in global finance and investment, facilitating the trading of securities and providing platforms for companies to raise capital.

2. Literature Review

Dr. Alpesh Gajera, (2020) study conducted a comparative analysis of major stock indices from different continents over a five - year period from 2015 to 2019. By examining the opening and closing times of these indices, the researcher gained insights into their movements and correlations, highlighting the interconnected nature of the global stock market. The study emphasized the evolution of the Indian market over time, noting that while the south Asian crisis of the late nineties had minimal impact on the Indian market due to government policies and the country's transition, the influence of other stock markets on the BSE and NSE increased in later time periods, albeit at a relatively insignificant level. The study also found a high correlation between stock indices within the same continent, particularly among European stock indices, while correlations between indices from different continents were generally lower. the study acknowledged that the performance of major stock indices can reflect the economic health and progress of a country.

The study by Stephen O. Uyaebo, Victor N. Atoi, and Farida Usman analyzed stock market volatility in Nigeria compared to other countries using asymmetric GARCH models. They examined daily stock indices from Nigeria, Kenya, United States, Germany, South Africa, and China from 2000 to 2013. Results showed that Nigeria and Kenya's stock returns react faster to market shocks than other countries. Additionally, Nigeria and Kenya lacked a leverage effect in stock returns compared to other countries. The study suggests that developing stock markets should focus on improving market infrastructure, instrument quality, and regulatory practices to moderate their response to market fluctuations.

Debjiban Mukherjee's study focuses on the comparative analysis of the Indian stock market with international markets, considering the increasing importance of stock markets amid globalization. The research examines trends, similarities, and patterns in the activities and movements of the Indian Stock Market compared to major international

counterparts like NYSE, HSE, TSE, RSE, and KSE. Both BSE and NSE are analyzed as part of the Indian Stock Market. The study spans various socio - politico - economic backgrounds and divides the time period into eras to test the correlation between exchanges, indicating that Indian markets have become more integrated with global counterparts and global trends.

LSIDA Mansaku and Samir Mansaku focus on comparing the performance of major stock exchanges worldwide, namely the New York Stock Exchange (NYSE), London Stock Exchange (LSE), and NASDAQ, from 2010 to 2014. They highlight the significance of stock exchanges as avenues for raising capital and funding projects. By analyzing key indicators, they assess the progress of these exchanges and track recent trends to aid decision - making processes. Their findings underscore the role of stock exchanges as reliable indicators of economic growth and their relevance to various market participants, including companies, investors, issuers, and scholars seeking insights into market movements and interdependencies among exchanges.

Aparna Bhatia's study explores stock market volatility in India and China amidst ongoing economic reforms and market liberalization. By analyzing data from the Bombay Stock Exchange and the Shanghai Stock Exchange from April 2004 to March 2012, the study aims to understand volatility patterns and interlinkages between the two markets. The research reveals that while both markets experienced peak volatility in 2008, the Indian stock market exhibited higher volatility compared to its Chinese counterpart. Despite this, Indian stock market returns were relatively higher than those in China during the studied period. The findings shed light on the dynamics of stock market volatility and its implications for investors and policymakers in both countries.

3. Research Methodology

The study aims to investigate the comparison between the world's top 10 stock markets over a specific period from 2018 to 2023. It adopts an exploratory research design to analyze the performance, volatility, and trends of these markets. Data collection is conducted through secondary sources, primarily websites, to ensure efficiency and speed. Non - probability convenience sampling is employed to select key indices and stocks from each market, including Sensex, Nifty, NYSE, NASDAQ, Tokyo Stock Exchange, Shanghai Stock Exchange, Hong Kong Stock Exchange, London Stock Exchange, Euronext, Shenzhen Stock Exchange, Toronto Stock Exchange, Deutsche Boerse, Bombay Stock Exchange, and Korea Exchange. The limitations of the study include potential challenges related to data availability, accuracy, regulatory differences, and geopolitical influences on market correlations. Despite these limitations, the study provides valuable insights into the dynamics of the world's top stock markets.

4. Data Analysis

The study is based on secondary data. And This chapter is all about the data collected from the NSE, BSE official website, yahoo finance, Euronext and several websites. The several stock market are BSE, NSE, NIFTY, NYSE, NASDAQ, Tokyo Stock Exchange, Shanghai Stock Exchange, Hong Kong Stock Exchange, London Stock Exchange, Euronext, Shenzhen Stock Exchange, Toronto Stock Exchange, Deutsche Boerse. the average data over a period of five years from 2019 - 2023. A series of tools used like correlation have been used to analyze the data and compare the stocks.

Correlation between variables from the year 2019 to 2023

	BSE Sensex	*NIFTY*	*NASDAQ*	*NYSE*	*TOKYO*	*SHANGHAI*	*HONG KONG*	*LONDON*	*EURONEXT*	*SHENZHEN*	*TORONTO*	*DEUTSCHE BOERSE*
BSE Sensex	1											
NIFTY	0.96	1										
NASDAQ	0.76	0.77	1									
NYSE	0.85	0.89	0.88	1								
TOKYO	0.91	0.86	0.86	0.86	1							
SHANGHAI	0.42	0.51	0.79	0.69	0.55	1						
HONG KONG	- 0.72	- 0.62	- 0.32	- 0.31	- 0.53	0.10	1					
LONDON	0.40	0.34	0.58	0.34	0.55	0.42	- 0.39	1				
EURONEXT	0.92	0.91	0.75	0.92	0.87	0.50	- 0.49	0.301	1			
SHENZHEN	0.45	0.54	0.84	0.67	0.57	0.94	- 0.06	0.57	0.46	1		
TORONTO	0.90	0.94	0.82	0.96	0.83	0.59	- 0.48	0.32	0.94	0.59	1	
DEUTSCHE BOERSE	0.73	0.67	0.51	0.502	0.63	0.207	- 0.82	0.66	0.62	0.35	0.63	1

In this study the correlation between BSE Sensex is highly positively correlated with the NIFTY, NASDAQ, NYSE, Tokyo Stock Exchange, Euronext, Toronto Stock Exchange, Deutsche Boerse and Low Positively Correlated with The Shanghai Stock Exchange, London Stock Exchange, Shenzhen Stock Exchange and has a negative correlation with Hong Kong Stock Exchange.

NIFTY is highly positively correlated with the NASDAQ, NYSE, Tokyo Stock Exchange, Shanghai Stock Exchange, Euronext, Shenzhen Stock Exchange, Toronto Stock Exchange, Deutsche Boerse and low positively correlated with the London Stock Exchange and has a negative correlation with Hong Kong Stock Exchange

ADF for Stationarity Test

Null Hypothesis: Unit root (individual unit root process)

Series: BSE, DEUTSCHE, EURO, HONGKONG, LONDON, NASDAQ, NSE,

Sample: 2019M01 2023M12			
Exogenous variables: Individual effects, individual linear trends			
Automatic selection of maximum lags			
Automatic lag length selection based on SIC: 0 to 1			
Total number of observations: 706			
Cross - sections included: 12			
Method		Statistic	Prob. **
ADF - Fisher Chi - square		327.028	0.0000
ADF - Choi Z - stat		- 16.2418	0.0000
** Probabilities for Fisher tests are computed using an asymptotic Chi - square distribution. All other tests assume asymptotic normality.			

Intermediate ADF test results UNTITLED				
Series	Prob.	Lag	Max Lag	Obs
BSE	0.0000	0	10	59
DEUTSCHE	0.0000	0	10	59
EURO	0.0000	0	10	59
HONGKONG	0.0000	0	10	59
LONDON	0.0000	1	10	58
NASDAQ	0.0000	0	10	59
NSE	0.0002	0	10	59
NYSE	0.0000	0	10	59
SANGHAI	0.0000	0	10	59
SHENZEN	0.0000	1	10	58
TOKYO	0.0000	0	10	59
TORENTO	0.0000	0	10	59

Interpretation

The result of the ADF stationery test conducted on multiple stock market indices, including BSE, DEUTSCHE, EURONEXT, HONGKONG, LONDON, NASDAQ, NSE, NYSE, SHANGHAI, SHENZHEN, TOKYO, TORONTO STOCK EXCHANGE, Over the period from janurary2019 to December 2023.

H0: The series has a unit root, indicating non - stationarity.

H1: The series does not have a unit root; thus it is a stationery.

Test statistic: the ADF test statistic is a measure of how strongly the H0 can be rejected. In this case, the test statistics for all series are significantly large, indicating strong evidence against the presence of a unit root and in favor of stationarity.

Probabilities (p - values): the probabilities associated with the ADF test statistics are provided. These probabilities indicate the likelihood of observing the test statistic if the H0 (unit root) were true. A p - value below a chosen significance level (commonly 0.05) indicates that the null hypothesis can be rejected. In this case, all the p - values are extremely small (close to zero), indicating strong evidence against the H0 and in favor of stationarity for all series.

Intermediate ADF test result: The series include the ADF test statistic, probability, lag used in the test, maximum lag, and the number of observations. This information confirms the stationarity of each series, with all probabilities close to zero.

In summary, based on the result of the ADF stationarity test, it can be concluded that all the stock market indices examined during the specified period exhibit stationary behavior. This implies that these indices do not have a unit root and demonstrate stable, predictable patterns over time.

Arch (1) and Garch (1) on BSE

Dependent Variable: BSE				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
GARCH = C (13) + C (14) *RESID (- 1) ^2 + C (15) *GARCH (- 1)				
Variable	Coefficient	Std. Error	z - Statistic	Prob.
DEUTSCHE	- 0.126202	0.194333	- 0.649409	0.5161
EURO	0.418560	0.369964	1.131354	0.2579
HONGKONG	- 0.510709	0.143378	- 3.561971	0.0004
LONDON	0.105406	0.117243	0.899034	0.3686
NASDAQ	- 0.132625	0.222081	- 0.597191	0.5504
NSE	0.303086	0.133995	2.261924	0.0237
NYSE	0.598411	0.527179	1.135118	0.2563
SANGHAI	0.260703	0.307314	0.848327	0.3963
SHENZEN	0.014342	0.195043	0.073535	0.9414
TOKYO	0.005174	0.206184	0.025095	0.9800
TORENTO	- 0.406031	0.339154	- 1.197188	0.2312
C	0.001021	0.006029	0.169433	0.8655
	Variance Equation			
C	0.000782	0.000600	1.302554	0.1927

RESID (- 1) ^2	0.558943	0.286229	1.952784	0.0508
GARCH (- 1)	- 0.124918	0.461110	- 0.270906	0.7865
R - squared	0.479930	Mean dependent var		0.013273
Adjusted R - squared	0.360748	S. D. dependent var		0.054072
S. E. of regression	0.043233	Akaike info criterion		- 3.616001
Sum squared resid	0.089715	Schwarz criterion		- 3.092415
Log likelihood	123.4800	Hannan - Quinn criter.		- 3.411197
Durbin - Watson stat	2.606738			

Interpretation:
This analysis of the ARCH and GARCH models to explore the volatility of the Bombay Stock Exchange (BSE) index.

The coefficients represent that the impact of each variable on the BSE index is volatile. The positive coefficients suggest a positive relationship with volatility, while negative coefficients indicate a negative relationship. The significance of coefficients is assessed by the z - statistic and associated probability values (Prob.). A low p - value (typically less than 0.05) suggests statistical significance.

Variance equation represent the volatility of the BSE index. The constant term (C) represents the baseline volatility. RESID (1) and GARCH (- 1) terms capture the lagged residual and lagged volatility, with respect to the volatility equation. R - squared and Adjusted R - squared provide goodness - of - fit measures for the variance equation.

Arch (1) and Garch (1) on NSE

Dependent Variable: NSE				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
GARCH = C (13) + C (14) *RESID (- 1) ^2 + C (15) *GARCH (- 1)				
Variable	Coefficient	Std. Error	z - Statistic	Prob.
DEUTSCHE	0.103152	0.133654	0.771782	0.4402
EURO	0.010872	0.316054	0.034398	0.9726
HONGKONG	0.003781	0.165010	0.022912	0.9817
LONDON	0.032557	0.093138	0.349556	0.7267
NASDAQ	- 0.295318	0.135379	- 2.181422	0.0292
BSE	0.197556	0.105682	1.869353	0.0616
NYSE	0.650944	0.445795	1.460186	0.1442
SANGHAI	0.312494	0.316520	0.987281	0.3235
SHENZEN	- 0.058328	0.236765	- 0.246353	0.8054
TOKYO	0.187909	0.040084	4.687911	0.0000
TORENTO	0.046477	0.362179	0.128326	0.8979
	Variance Equation			
C	0.000389	0.000588	0.661603	0.5082
RESID (- 1) ^2	- 0.113148	0.172961	- 0.654182	0.5130
GARCH (- 1)	0.591081	0.766022	0.771624	0.4403
R - squared	0.632218	Mean dependent var		0.010213
Adjusted R - squared	0.547934	S. D. dependent var		0.047243
S. E. of regression	0.031764	Akaike info criterion		- 3.960053
Sum squared resid	0.048431	Schwarz criterion		- 3.436467
Log likelihood	133.8016	Hannan - Quinn criter.		- 3.755249
Durbin - Watson stat	1.451974			

Interpretation
This analysis of the ARCH and GARCH models to explore the volatility of the National Stock Exchange (NSE) index.

The Coefficients represent that the impact of each variable on NSE index volatile. The Positive coefficients suggest a positive relationship with volatility, indicating that an increase in the variable leads to increased volatility in the NSE index. While, negative coefficients indicate a negative relationship, where an increase in the variable corresponds to decreased volatility in the NSE index.

Variance equation represent that the NSE index is volatile. RESID (- 1) and GARCH (- 1) capture the lagged residual and lagged volatility, with respect to the volatility equation. R - squared and Adjusted R - squared measure the goodness - of - fit for the variance equation.

5. Conclusion

In conclusion, this research offers a thorough examination of the world's top 10 stock markets spanning the period from 2018 to 2023. By employing an exploratory research design and leveraging secondary data sources, the study delved into the performance, volatility, and trends of key indices and stocks across major exchanges globally. Notably, significant correlations among certain exchanges underscored the interconnected nature of the global stock market, while variations in volatility and risk levels highlighted distinct market dynamics. For instance, Nigeria and Kenya demonstrated heightened sensitivity to market fluctuations compared to more established markets like the United States and Germany. Through the application of fundamental and technical analysis methods, the study provided insights into the financial health and price trends of stocks, shedding light on market dynamics and interdependencies among exchanges. Furthermore, the utilization of ARCH/GARCH models demonstrated the impact of various factors on market volatility, particularly evident in indices such as the Bombay

Stock Exchange (BSE) and the National Stock Exchange (NSE) in India. Overall, this research contributes valuable insights for investors, policymakers, and financial analysts, aiming to inform decision - making and foster international collaboration in the ever - evolving global financial landscape.

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