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Does Stock Market Volatility in International Market Affect Volatility in Indian Market?

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Abstract- *Introduction:* Volatility in the prices of stock market creates an atmosphere of uncertainty and hampers productive investment. Foreign market changes are considered as one of the factors affecting the Indian stock market. The volatility in the Indian stock market exhibits characteristics similar to those found earlier in many of the major developed and emerging stock markets.

Purpose: The purpose of paper is to investigate the nature and characteristics of stock market volatility in India compare to foreign markets. The study establishes relationship in the movements of the Indian Stock Market in comparison to its international counterparts. *Methodology:* To study the effect on Indian stock market (SENSEX) with the change in the other foreign market indices, 13 major foreign stock exchanges has been selected based on the Market Capitalization.

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Methodology: To study the effect on Indian stock market (SENSEX) with the change in the other foreign market indices, 13 major foreign stock exchanges has been selected based on the Market Capitalization. BSE Sensex data has been compared with major stock indices including AORD, BOVESPA, S & P/ TSX, SSECOMPOSITE, CAC40/FCHI, HSI, DAX, JCI, FTSEMIB, NIKKEI 225, SMI, FTSE100 and DOWJONES.

Data Collection and Analysis: The research is based on secondary data of Indian Stock Exchange (Sensex) and other foreign stock exchanges. The data is taken for a period of 5 years (January 1st, 2010 to December 31st, 2014). Daily closing value of all the indices has been considered for analysis. Data has been analysed using Linear regression of BSE Sensex with foreign indices through SPSS.

Keywords: volatility, stock market, indices.

I. Introduction

Presently, the fluctuations in the Indian market are attributed heavily to cross border capital flows in the form of FDI, FII and to reaction of Indian market to global market cues. In this context, understanding the relationship and influence of various exchanges on each other is very important. This study that compares global exchanges which are from different geo politico- socio-economic areas. With the cross border movements of capital like never before in the form of FDI and FII, coupled with the easing of restrictions bringing various stock exchanges at par in terms of system and regulations, it can be assumed reasonably that a particular stock exchange will have some impact on other exchanges. The main objective of this study is to capture the trends, similarities and patterns in the activities and movements of the Indian Stock Market in comparison to its international counterparts. The aim is to help the investors (current and potential) understand the impact of important happenings on the Indian Stock exchange. This is especially relevant in the current scenario when the financial markets across the globe are getting integrated into one big market and the impact of one exchange on the other exchanges. In other words, the intention is to test the hypothesis, 'whether various stock exchanges globally have any impact on each other' or they are correlated in any way with regard to their movements and, if so, to what extent. Arising out of the main hypothesis is the question - given the above context: What impact would the result have on the understanding that international diversification of investment is desirable and profitable with regard to both risk and return

a) Objectives of Study

- To study the volatility of Indian stock market with changes in the value of the other foreign markets.
- To identify the market indices that significantly affects the volatility of the Indian stock market.

b) Need for the study

This study would thus help investors, analysts and other stakeholders in finding a relation between the volatility in Indian stock market and changes in foreign market and would thus help in making informed decisions. Risk averse and risk neutral investors may shy away from the market with frequent and sharp price movements. Investors will also get idea about how will Indian market behave with respect to particular change in any particular market. The study will enable the investors, analysts and other stakeholders of the economy to make better decisions based on the findings of the report.

II. Literature Review

Michel felder Richard A., Pandya Saurin(2005) analyzed the volatility of stock returns and predictability for seven emerging markets for six countries (India, Hong Kong, South Korea, Malaysia, Singapore, Taiwan) and compared them with the mature markets of Japan and the US. The made use of skewness, excessive kurtosis, EGARCH and SKED models for analysis. It was found that emerging markets have higher volatility but lower persistence of shocks than in the mature markets. It was also found that the impact of non-trading days on the volatility of emerging market stock returns was

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Rajwani Shegorika and Mukherjee Jaydeep (2013) investigated the linkages between Indian stock markets with other Asian stock markets namely, Hong Kong, Indonesia, Japan, South Korea, Malaysia, Taiwan and China. They used the daily data of the stock market indices of these countries and analyzed using units root test and Gregory and Hansen Cointegration technique. The results suggested that the Indian stock markets are not integrated with any of the Asian markets either individually or collectively, and thus lead to a conclusion that Indian markets are not sensitive to the dynamics in these markets in the long run.

Mukherjee Paramitaand Bose Suchismita (2005) examined whether the Indian stock market moves with other markets in Asia and the United States. They analyzed the daily data of the indices of these markets and used tools like group wise and pair wise co-integration and Granger-casuality tests. In the period of research from 1999 to 2004, it was found that on a daily basis the Indian index is most highly correlated with the Singapore STI index, and is also very highly correlated with the stock indices of Malaysia, South Korea, Taiwan and Thailand, while, the least correlation is observed with the US S&P500 index. The degree of integration that is found to be not very high implies that the nature of integration with emerging Asian markets does not yet warranty any immediate concern for India regarding possible crisis and also shows that there is still much scope for investors for reaping benefits of portfolio diversification, by investing in Indian markets.

Sarkar, Amitava and Chakrabarti, Gagari and Sen, Chitrakalpa (2008) investigated the volatility of Indian Stock Market with other foreign markets. It used SENSEX as Indian Stock Index and Dow Jones, FTSE, BVSP, MerVal and JKSE for overseas indices. It was found that impact of developed countries, particularly US market has been quite prominent. As Brazilian and Argentine economies are quite similar to India's, their impact was mild. Evidences of regional contagion were also observed as Jakarta Stock Exchange transmitted its volatility to SENSEX. This has strong implication for the investors as well as policy implications as it highlights the extent of exposure and also the vulnerability of Indian stock market to the world.

Tripathi, Vanita and Sethi, Shruti (2012)examined the short run and long run inter linkages of the Indian stock market with those of Advanced emerging markets viz. Brazil, Hungary, Taiwan, Mexico, Poland and South Africa. They analyzed the daily data from 1992 to 2009 using Johansen co-integration test and Granger's causality test. It was found that the short run and long run inter linkages of the Indian stock market with these markets has increased over the study period. Liberalization policies adopted by these nations, increasing economic relations, rapid information transmission, contagion effect and common investor group could be the plausible reasons behind such results.

Mukherjee Debjiban (2007) captured the trends, similarities and patterns in the activities and movements of the Indian Stock Market in comparison to its international counterparts in the context of globalization and the subsequent integration of the global markets. The data of 5 global and 2 Indian indices were collected for a period of 12 years from 1995; and this period was divided into 4 smaller periods. Comparative analysis was then carried out both on qualitative and quantitative parameters. It was found that the markets have started to integrate and Indian market is no exception, especially after 2002-03.

S. Bordoloi and Shankar Shiv (2008) tried to develop alternative models from the ARCH/ GARCH family to model the Indian equity markets. The equity market was represented by the two widely traded stock exchanges in India – BSE and NSE. Two stock indices, from each of the exchanges are selected for empirical analysis. The sample was taken for a period of almost 7 years. The stock returns are found to have possessed the asymmetrical property. The Threshold GARCH (TARCH) models were found to have explained the volatilities better for both the BSE Indices and S&P-CNX 500, while the Exponential GARCH (EGARCH) model is found to be superior for the S&P CNX-Nifty. Statistical tests in frequency domain were also conducted to test whether the volatilities for all the indices move in tandem or not, and it was found that the volatilities for all the indices move in tandem.

Sabur Mollah and Asma Mobarek (2009) tried to find out the time-varying risk return relationship and the persistence of shocks to volatility within GARCH framework both in developed and emerging markets. They used nonlinear ARCH and GARCH-family models for testing the volatility both in developed and emerging markets. The empirical results reported high risk-return and predictable nature of emerging markets compared to developed markets. The findings of the paper suggest that there is a long-term persistence shock in emerging markets compared to developed markets.

Mobarek Asma and Li Michelle (2014) in their paper suggested that the company-specific factors played a more crucial role in the Asia-Pacific countries than what was evident in the European and Latin-American countries. The time-varying weighting methodology was used to determine whether the volatility function was due to country-specific factors. The results showed that the influence of the common factors was significantly enhanced during the period of sub-prime financial crisis.

Karmakar Madhusudan (2006) measured the volatility of daily stock return in the Indian stock market over the period from 1961 to 2005. The study reported an evidence of time varying volatility; periods of high

and low volatility clustering were also found; also high persistence and predictability was observed in volatility. It was also observed that volatility responds asymmetrically for positive and negative shocks. The conditional volatility also showed a clear evidence of volatility shifting over the period under study.

Affaneh Ibrahim and Boldin Robert (2001) examined five regional emerging markets in terms of volatility, correlations and effects of day of the week, month of the year and seasonally. The regional markets studied were Egypt, Greece, Israel, Jordan and Turkey. Data were analysed for the five years from 1993-1998. One of the finding was that there was an improvement in the stability of the markets over the period as measured by the variance ratio; this was the case despite the relatively high volatility in the markets. Also, low correlations were evident among the markets using the return factor (percentage change in the index). Conversely, high correlations were found using the index level.

Aggarwal Reena, Inclan Carla, and Leal Ricardo (1999) examined shifts in volatility of emerging stock market returns and the events that are associated with the increased volatility. The period of study was 1985-1995. The large changes in volatility seem to be related to important country-specific political, social, and economic events. These events include the stock market scandal in India, the Mexican peso crisis, periods of hyperinflation in Latin America, and the Marcos-Aquino conflict in the Philippines.

Chang Hsiao-fen (2012) tried to compare the volatility in stock market returns prior and post global financial crisis of 2008. For the study analysis of the closing price of stock indexes of Europe, America, and Taiwan, which are EURO STOXX 50, S&P 500, and TAIEX respectively are taken. Data was taken for a period of 6 years from 2005 to 2011. Taiwan's VIX was found to be evidently higher than America's and Europe's before the crisis. While after the crisis, Taiwan's VIX was mostly lower than America's and Europe's.

III. Research Methodology

The study is descriptive in nature. Quantitative Research approach has been used. The research is based on secondary data of Indian Stock Exchange (Sensex) and other foreign stock exchanges. The data is taken for a period of 5 years (January 1st, 2010 to December 31st, 2014). Daily closing value of all the indices has been taken for analysis. Daily data has been as daily data would reflect proper volatility of the stock markets. Data analysis has been done using SPSS. Linear regression of BSE Sensex with foreign indices has been done. To study the effect on Indian stock market (SENSEX) with the change in the other foreign market indices, we have considered 13 foreign stock exchanges based upon market capitalization. Major indices the countries like Australia (AORD), Brazil (BOVESPA), Canada(S & P/ TSX), China (SSECOMPOSITE), France (CAC40/FCHI), Hong Kong (HIS), Germany (DAX), Indonesia (JCI), Italy (FTSEMIB), Japan (NIKKEI225), Switzerland (SMI), United Kingdom (FTSE100), United States of America (DOWJONES).

IV. Hypothesis of Study

H0: There is no significant correlation between Sensex and foreign market indices.

H1: There is a significant correlation between Sensex and foreign market indices.

V. Analysis

a) *Comparison of BSE Sensex with all Ordinaries – AORD (Australia)*

From Table -1, it can be concluded that there is a correlation between AORD and Sensex Since R>0.05, H0 is rejected. R value of .805 signifies a highly positive correlation which means both the indices would move in the same direction. R2 value of 0. 648 shows that AORD causes 64.8% variation in SENSEX. The unstandardized coefficient of 5.662 shows that when SENSEX moves by 1 unit, AORD moves by 5.662 units. Thus we can conclude that when the stock market in Australia goes up, Indian stock market is also expected to go up, and vice versa.

b) *Comparison of BSE Sensex with BOVESPA (Brazil)*

There exists correlation between BOVESPA and Sensex. (Table – 2 in appendix) Since R<0.05, H0 is rejected. R value of -.328 signifies a negative correlation which means both the indices would move in opposite directions. R2 value of 0. 107 shows that BOVESPA causes 10. 7% variation in SENSEX which is quite low. The unstandardized coefficient of -0.145 shows that when SENSEX moves by 1 unit, AORD moves by 0.145 units in the other direction. Thus, it can be concluded that when the stock market in Brazil goes up, Indian stock market is expected to go down, and vice versa.

c) *Comparison of BSE Sensex with Toronto Stock Exchange – TSX (Canada)*

Since R>0.05, H0 is rejected, hence there exists correlation between TSX and Sensex. (Table 3 in Appendix) R value of .852 signifies a highly positive correlation which means both the indices would move in the same direction. R2 value of 0.726 shows that TSX causes 72.6% variation in SENSEX. The unstandardized coefficient of 2.343 shows that when SENSEX moves by 1 unit, TSX moves by 2.343 units. Thus, when the stock market in Canada goes up, Indian stock market is also expected to go up, and vice versa.

d) *Comparison of BSE Sensex with FCHI (France)*

H0 is rejected Since R>0.05. Hence there exists correlation between FCHI and Sensex.(Table-4 in

appendix). R value of .763 signifies a highly positive correlation which means both the indices would move in the same direction. R2 value of 0.583 shows that FCHI causes 58.3% variation in SENSEX. The un standardized coefficient of 5.424 shows that when SENSEX moves by 1 unit, FCHI moves by 5.424 units. Thus, when the stock market in France goes up, Indian stock market is also expected to go up, and vice versa.

e) Comparison of BSE Sensex with DAX (Germany)

There exists a correlation between DAX and Sensex (Table-5 in Appendix) Since R>0.05, H0 is rejected .R value of .836 signifies a highly positive correlation which means both the indices would move in the same direction. R2 value of 0.698 shows that DAX causes 69.8% variation in SENSEX. The unstandardized coefficient of 1.886 shows that when SENSEX moves by 1 unit, DAX moves by 1.886 units. Thus we can conclude that when the stock market in Germany goes up, Indian stock market is also expected to go up, and vice versa.

f) Comparison of BSE Sensex with HSI (Hong Kong)

Table -6 in appendix signifies that Since R>0.05, H0 is rejected, hence there exists correlation between HSI and Sensex. R value of 0.702 signifies a positive correlation which means both the indices would move in the same direction. R2 value of 0.493 shows that HSI causes 49.3% variation in SENSEX. The unstandardized coefficient of 1.250 shows that when SENSEX moves by 1 unit, HSI moves by 1.250 units. Thus it can concluded that when the stock market in Hong Kong goes up, Indian stock market is also expected to go up, and vice versa.

g) Comparison of BSE Sensex with JCI (Indonesia)

R value of .695 signifies a positive correlation which means both the indices would move in the same direction (Table – 7 in appendix).R2 value of 0.483 shows that JCI causes 48.3% variation in SENSEX. The unstandardized coefficient of 2.930 shows that when SENSEX moves by 1 unit, JCI moves by 2.930 units. Thus it can be concluded that when the stock market in Indonesia goes up, Indian stock market is also expected to go up, and vice versa.

h) Comparison of BSE Sensex with FTSEMIB (Italy)

Since R>0.05, H0 is rejected, hence there exists correlation between FTSEMIB and Sensex (Table – 8 in appendix). R value of .430 signifies a positive correlation which means both the indices would move in the same direction.R2 value of 0.185 shows that FTSEMIB causes 18.5% variation in SENSEX. The unstandardized coefficient of 0.466 shows that when SENSEX moves by 1 unit, FTSEMIB moves by 0.466 units. Thus we can conclude that when the stock market in Italy goes up, Indian stock market is also expected to go up, and vice versa.

i) Comparison of BSE Sensex with NIKKEI (Japan)

Since R>0.05, H0 is rejected, hence there exists correlation between NIKKEI and Sensex (Table – 9 in appendix). R value of .801 signifies a highly positive correlation which means both the indices would move in the same direction. R2 value of 0.641 shows that NIKKEI causes 64.1% variation in SENSEX. The unstandardized coefficient of 0.893 shows that when SENSEX moves by 1 unit, NIKKEI moves by 0.893 units. Thus we can conclude that when the stock market in Japan goes up, Indian stock market is also expected to go up, and vice versa.

j) Comparison of BSE Sensex with SSE (China)

Since R<0.05, H0 is rejected, hence there exists correlation between SSE and Sensex (Table –10 in appendix). R value of -0.276 signifies a negative correlation which means both the indices would move in opposite direction. R2 value of 0.076 shows that SSE causes 7.6% variation in SENSEX which is very low. The un standardized coefficient of -2.410 shows that when SENSEX moves by 1 unit, SSE moves by -2.410 units in the opposite direction. Thus it can be said that when the stock market in China goes up, Indian stock market is expected to go down, and vice versa.

k) Comparison of BSE Sensex with SMI (Switzerland)

Since R>0.05, H0 is rejected, hence there exists correlation between SMI and Sensex (Table –11 in appendix). R value of .832 signifies a highly positive correlation which means both the indices would move in the same direction. R2 value of 0.693 shows that SMI causes 69.3% variation in SENSEX. The unstandardized coefficient of 2.405shows that when SENSEX moves by 1 unit, SMI moves by 2.405 units. Thus we can conclude that when the stock market in Switzerland goes up, Indian stock market is also expected to go up, and vice versa.

l) Comparison of BSE Sensex with DOW JONES – DJI (United States of America)

Since R>0.05, H0 is rejected, hence there exists correlation between DJI and Sensex (Table – 12 in appendix). R value of .792 signifies a highly positive correlation which means both the indices would move in the same direction. R2 value of 0.628 shows that DJI causes 62.8% variation in SENSEX. The unstandardized coefficient of 1.063 shows that when SENSEX moves by 1 unit, DJI moves by 1.063 units. Thus we can conclude that when the stock market in USA goes up, Indian stock market is also expected to go up, and vice versa.

m) Comparison of BSE Sensex with FTSE (United Kingdom)

Since R>0.05, H0 is rejected, hence there exists correlation between FTSE and Sensex (Table – 13 in appendix). R value of. 745 signifies a positive correlation which means both the indices would move in

t same direction. R2 value of 0.555 shows that FTSE causes 55.5% variation in SENSEX.

The un standardized coefficient of 4.278shows that when SENSEX moves by 1 unit, FTSE moves by 4.278 units. Thus we can conclude that when the stock market in UK goes up, Indian stock market is also expected to go up, and vice versa.

VI. Conclusion

The above analysis reveals that Sensex is highly correlated with Australian (AORD), Canadian (TSX), French (FCHI), German (DAX), Japanese (NIKKEI), Swiss (SMI) and American (DJI) markets. A slight change in these markets causes a significant effect on Indian markets. It can be seen that Sensex is negatively correlated with Brazilian (BOVESPA) and Chinese (SSE) markets. So a change in these markets causes an opposite change in Sensex. The Toronto Stock Exchange (Canada) has the highest correlation, which shows that it causes maximum impact on the Indian market. It can also be observed that Indian stock market is significantly affected by the stock market of the developed countries.

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Annexures

1. Comparison of BSE Sensex with All Ordinaries – AORD (Australia)

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19565.4116	3012.06835	1205
AORD	4806.187	428.3907	1205

Correlations

		Sensex	AORD
Pearson Correlation	Sensex	1.000	.805
	AORD	.805	1.000
Sig. (1-tailed)	Sensex	.	.000
	AORD	.000	.
N	Sensex	1205	1205
	AORD	1205	1205

Model Summary

Model	R	R Square	Adiusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.805[a]	.648	.648	1786.72562	.648	2218.688	1	1203	.000

a. Predictors: (Constant), AORD

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-7646.146	579.992		-13.183	.000	-8784.055	-6508.237
	AORD	5.662	.120	.805	47.103	.000	5.426	5.898

a. Dependent Variable: Sensex

2. Comparison of BSE Sensex with BOVESPA (Brazil[1])

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19559.0986	3005.65192	1184
BOVESPA	58914.42	6773.429	1184

Correlations

		Sensex	BOVESPA
Pearson Correlation	Sensex	1.000	-.328
	BOVESPA	-.328	1.000
Sig. (1-tailed)	Sensex	.	.000
	BOVESPA	.000	.
N	Sensex	1184	1184
	BOVESPA	1184	1184

[1] Table-2 Comparison of BSE Sensex with BOVESPA (Brazil[1])

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.328[a]	.107	.107	2840.97427	.107	142.121	1	1182	.000

a. Predictors: (Constant), BOVESPA

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	28123.881	723.164		38.890	.000	26705.052	29542.710
	BOVESPA	-.145	.012	-.328	-11.921	.000	-.169	-.121

a. Dependent Variable: Sensex

3. Comparison of BSE Sensex with Toronto Stock Exchange – TSX (Canada)[2]

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19554.6720	2991.88919	1193
TSX	12890.446	1087.6753	1193

Correlations

		Sensex	TSX
Pearson Correlation	Sensex	1.000	.852
	TSX	.852	1.000
Sig. (1-tailed)	Sensex	.	.000
	TSX	.000	.
N	Sensex	1193	1193
	TSX	1193	1193

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.852[a]	.726	.725	1567.72577	.726	3150.373	1	1191	.000

a. Predictors: (Constant), TSX

[2] Table-3 Comparison of BSE Sensex with Toronto Stock Exchange – TSX (Canada)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-10650.520	540.057		-19.721	.000	-11710.090	-9590.950
	TSX	2.343	.042	.852	56.128	.000	2.261	2.425

a. Dependent Variable: Sensex

4. Comparison of BSE Sensex with FCHI (France)[3]

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19618.3554	3009.98743	1196
FCHI	3788.8711	423.64204	1196

Correlations

		Sensex	FCHI
Pearson Correlation	Sensex	1.000	.763
	FCHI	.763	1.000
Sig. (1-tailed)	Sensex	.	.000
	FCHI	.000	.
N	Sensex	1196	1196
	FCHI	1196	1196

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.763[a]	.583	.583	1944.80587	.583	1668.495	1	1194	.000

a. Predictors: (Constant), FCHI

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-934.187	506.289		-1.845	.065	-1927.503	59.129
	FCHI	5.424	.133	.763	40.847	.000	5.164	5.685

a. Dependent Variable: Sensex

5. Comparison of BSE Sensex with DAX (Germany)[4]

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19597.6727	2994.40971	1196
DAX	7509.9877	1326.69535	1196

Correlations

		Sensex	DAX
Pearson Correlation	Sensex	1.000	.836
	DAX	.836	1.000
Sig. (1-tailed)	Sensex	.	.000
	DAX	.000	.
N	Sensex	1196	1196
	DAX	1196	1196

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.836[a]	.698	.698	1646.00536	.698	2760.830	1	1194	.000

a. Predictors: (Constant), DAX

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	5435.328	273.705		19.858	.000	4898.331	5972.324
	DAX	1.886	.036	.836	52.544	.000	1.815	1.956

a. Dependent Variable: Sensex

6. Comparison of BSE Sensex with HSI (Hong Kong)[5]

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19563.9720	2998.16327	1196
HIS	21829.0050	1684.13767	1196

[4] Table – 5 Comparison of BSE Sensex with DAX (Germany)
[5] Table – 6 *Comparison of BSE Sensex with HSI (Hong Kong)*

Correlations

		Sensex	HIS
Pearson Correlation	Sensex	1.000	.702
	HSI	.702	1.000
Sig. (1-tailed)	Sensex	.	.000
	HSI	.000	.
N	Sensex	1196	1196
	HSI	1196	1196

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.702[a]	.493	.493	2135.61387	.493	1161.228	1	1194	.000

a. Predictors: (Constant), HIS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-7722.911	803.124		-9.616	.000	-9298.603	-6147.219
	HSI	1.250	.037	.702	34.077	.000	1.178	1.322

a. Dependent Variable: Sensex

7. Comparison Of BSE Sensex With JCI (Indonesia)[6]

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19553.6870	3011.60795	1166
JCI	4067.2661	714.41182	1166

Correlations

		Sensex	JCI
Pearson Correlation	Sensex	1.000	.695
	JCI	.695	1.000
Sig. (1-tailed)	Sensex	.	.000
	JCI	.000	.
N	Sensex	1166	1166
	JCI	1166	1166

[6] Table -7 *Comparison of BSE Sensex with JCI (Indonesia)*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.695[a]	.483	.483	2166.04455	.483	1088.102	1	1164	.000

a. Predictors: (Constant), JCI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	7635.968	366.818		20.817	.000	6916.269	8355.667
	JCI	2.930	.089	.695	32.986	.000	2.756	3.104

a. Dependent Variable: Sensex

8. Comparison of BSE Sensex with FTSEMIB (Italy)[7]

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19611.7085	2991.81506	1193
FTSEMIB	18353.678	2757.8049	1193

Correlations

		Sensex	FTSEMIB
Pearson Correlation	Sensex	1.000	.430
	FTSEMIB	.430	1.000
Sig. (1-tailed)	Sensex	.	.000
	FTSEMIB	.000	.
N	Sensex	1193	1193
	FTSEMIB	1193	1193

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.430[a]	.185	.184	2702.73619	.185	269.624	1	1191	.000

a. Predictors: (Constant), FTSEMIB

[7] Table – 8 *Comparison of BSE Sensex with FTSEMIB (Italy)*

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	11057.017	526.828		20.988	.000	10023.402	12090.632
	FTSEMIB	.466	.028	.430	16.420	.000	.410	.522

a. Dependent Variable: Sensex

9. Comparison of BSE Sensex with NIKKEI (Japan)[8]

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19591.5357	3028.87256	1170
NIKKEI	11493.9188	2715.60408	1170

Correlations

		Sensex	NIKKEI
Pearson Correlation	Sensex	1.000	.801
	NIKKEI	.801	1.000
Sig. (1-tailed)	Sensex	.	.000
	NIKKEI	.000	.
N	Sensex	1170	1170
	NIKKEI	1170	1170

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.801[a]	.641	.641	1814.77839	.641	2088.337	1	1168	.000

a. Predictors: (Constant), NIKKEI

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	9325.133	230.836		40.397	.000	8872.234	9778.033
	NIKKEI	.893	.020	.801	45.698	.000	.855	.932

a. Dependent Variable: Sensex

[8] Table – 9 *Comparison of BSE Sensex with NIKKEI (Japan)*

10. Comparison of BSE Sensex with SSE (China)[9]

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19472.7277	2912.85357	1161
SSE	2427.7209	333.92015	1161

Correlations

		Sensex	SSE
Pearson Correlation	Sensex	1.000	-.276
	SSE	-.276	1.000
Sig. (1-tailed)	Sensex	.	.000
	SSE	.000	.
N	Sensex	1161	1161
	SSE	1161	1161

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.276[a]	.076	.076	2800.68596	.076	95.777	1	1159	.000

a. Predictors: (Constant), SSE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	25323.614	603.473		41.963	.000	24139.592	26507.635
	SSE	-2.410	.246	-.276	-9.787	.000	-2.893	-1.927

a. Dependent Variable: Sensex

11. Comparison of BSE Sensex with SMI (Switzerland)[10]

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19587.5225	2996.28871	1194
SMI	7044.335	1037.2480	1194

[9] Table – 10 Comparison of BSE Sensex with SSE (China)
[10] Table- 11 *Comparison of BSE Sensex with SMI (Switzerland)*

Correlations

		Sensex	SMI
Pearson Correlation	Sensex	1.000	.832
	SMI	.832	1.000
Sig. (1-tailed)	Sensex	.	.000
	SMI	.000	.
N	Sensex	1194	1194
	SMI	1194	1194

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.832[a]	.693	.693	1660.75029	.693	2691.283	1	1192	.000

a. Predictors: (Constant), SMI

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2647.216	330.062		8.020	.000	1999.649	3294.783
	SMI	2.405	.046	.832	51.878	.000	2.314	2.496

a. Dependent Variable: Sensex

12. Comparison of BSE Sensex with FTSE (United Kingdom)[11]

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19636.8371	2993.02942	1188
FTSE	6024.779	521.2495	1188

Correlations

		Sensex	FTSE
Pearson Correlation	Sensex	1.000	.745
	FTSE	.745	1.000
Sig. (1-tailed)	Sensex	.	.000
	FTSE	.000	.
N	Sensex	1188	1188
	FTSE	1188	1188

Table- 12 *Comparison of BSE Sensex with FTSE (United Kingdom)*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.745[a]	.555	.555	1997.16571	.555	1479.904	1	1186	.000

a. Predictors: (Constant), FTSE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-6138.301	672.515		-9.127	.000	-7457.754	-4818.849
	FTSE	4.278	.111	.745	38.470	.000	4.060	4.496

a. Dependent Variable: Sensex

13. Comparison of BSE Sensex with DOW JONES – DJI (United States of America)[12]

Descriptive Statistics

	Mean	Std. Deviation	N
Sensex	19576.1551	2998.50317	1192
DJI	13445.283582	2235.1711836	1192

Correlations

		Sensex	DJI
Pearson Correlation	Sensex	1.000	.792
	DJI	.792	1.000
Sig. (1-tailed)	Sensex	.	.000
	DJI	.000	.
N	Sensex	1192	1192
	DJI	1192	1192

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.792[a]	.628	.628	1829.81889	.628	2008.192	1	1190	.000

[12] Table- 13 Comparison of BSE Sensex with DOW JONES- DJI (United States of America)

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	5283.463	323.315		16.342	.000	4649.131	5917.794
	DJI	1.063	.024	.792	44.813	.000	1.016	1.110

a. Dependent Variable: Sensex