Cointegration of Indian Stock Market with Global Stock Markets – An Empirical Analysis

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Abstract

The interdependence of the Indian stock market with global markets underscores the significance of global forces in influencing investment choices and market dynamics. In order to make well-informed decisions and efficiently manage risks, investors must keep an eye on economic developments in their countries as well as in other countries. The present study aims to understand the degree of cointegration of Indian stock market with the selected stock markets of Europe, Asia and US. In this study the major nine global indices have been studied covering the span of 21 years and analyzed by using multivariate regression model. The study found the high degree of cointegration of Indian stock market with the markets of US, Hongkong, Japan and London and low degree of cointegration with stock market of China.

Keywords: Cointegration, Nifty50, FTSE100, Hang Seng, S&P500,Nikkei

Introduction

This is the era of interconnected economies where the slight disturbance in one economy affects the economy of other countries. A famous diplomat from France, Klemens Wenzel Metternich, once said: "When the US sneezes, the entire world catches a cold." This saying has gained even more significance over the years. The saying explains that whatever happens in the US, its effects are felt globally, and not only just in the US. The global financial crisis of 2007 is an excellent example, which reflects the strong impact of the US market on the Indian market. Due to the interconnected economies, the financial crisis of 2007 quickly turned into a full-blown global economic downturn as credit markets collapsed, advanced economies' aggregate demand declined, and commodity prices plummeted, forcing exporters to cut back on spending and fire a large number of employees. As a result, global industrial production plummeted. Large economies and advanced economies, such as the PRC and India, saw a decline in industrial production in the final quarter of 2008. During the third and fourth quarters of fiscal year (FY) 2008, industrial output decreased by more than 10% in a number of major export-oriented nations, including Brazil, Germany, and Japan. Layoffs and rising unemployment were almost a given due to the drop in industrial output.

Due to globalization the linkage of different economies and their interdependence has been increasing. The technology and use of technology in fast communication has been playing a crucial role in updating the world about recent developments in any nation. News flow has been very instrumental in the stock market mechanism. This news can be related to inflation, GDP growth, election results, COVID-19 bailout, fiscal deficit, etc. These events decide the investor's reaction, flows of Foreign Institutional Investors (FIIs), Foreign Portfolio Investors (FPIs), etc. As the global economy has been witnessing the dynamism due to various economic, political and social changes therefore for understanding the pattern of growth of the stock market the integration of various international stock markets with the Nation's stock market should be studied time to time.

Literature Review

In the studies by Hamao et al., 1990; Becker et al., 1990; Liu, Pan, & Shieh, 1998; Eun & Shim, (1989) It was found that the USA was the most influential stock market. Wong, Agarwal, and Du (2005) found that for the post liberalization period the Indian stock market was integrated with the USA, the UK and Japan. Whereas Nath and Verma (2003) concluded in their study that there was no co-integration between the Indian stock market with those of Taiwan and Singapore. Ammer and Mei (1996) found that there was a lag in international transmission of economic shocks.

Mukherjee and Mishra (2005) in their study found the integration of Indian stock market with markets of Malaysia, Indonesia, Thailand, Philippines and Korea . Bose and Mukherjee (2006) found that there was no integration of the Indian stock market with that of the markets of USA, Japan, South Korea, Hong Kong, Malaysia, Taiwan, Singapore, and Thailand.

Dasgupta (2016) focused on the US and India while examining the cointegration and dynamic relationships of growing economies worldwide. It is discovered that the Indian stock market, along with a few others, has short-term granger ties with most of its BRIC peers. Nine co-integration linkages are discovered over the long term. It suggests a cointegration of these stock markets. At least temporarily, the US has demonstrated its control over most markets and its dynamic connections with them. Overall, our study has shown that investors in the US and other countries are not offered any opportunities for portfolio diversification by the stock markets of developing economies or by Russia.

Previous studies have looked at the relationship between asset prices in different foreign marketplaces. Ten major stock markets' daily closing price fluctuations were analyzed by Hilliard (1979) for both contemporaneous and lagged correlation. The Australian, British, Canadian, Japanese, and American stock markets' daily closing prices were studied by Jaffe and Westerfield (1985a, 1985b). Daily price volatility and volume for common equities dual listed on the New York and Tokyo stock exchanges were investigated by Barclay, Litzenberger, and Warner (1990) in contrast to Eun and Shim (1989) who looked at daily stock returns across nine national stock markets. They all present data indicating favorable correlations between daily close-to-close results on different stock exchanges.

Research Gap and Problem Statement

The available research studies give mixed views in terms of the integration of stock markets of the different countries. Therefore, the research gap has been identified for the study of selected global stock markets and their cointegration for the past twenty-one years. The research question is - Is the performance of stock market of India dependent on stock market of selected countries?

Objectives of the Study

- To understand the sensitivity of the Indian stock market to global economic developments.
- To assess the cointegration of performance of the Indian stock market with the selected global stock markets.

Research Methodology

In this descriptive research, the secondary data has been used for the research. To study the cointegration of Indian stock market with global stock markets, the leading global markets have been selected. These selected markets have strong economic impact on the other economies. For the present study the European market includes London Stock Exchange, the Paris Stock Exchange, Frankfurt Exchange, The American Market includes New York Stock Exchange (NYSE), The Nasdaq Stock Market LLC and Cboe BZX Exchange, and the Asian Market it includes Tokyo Stock Exchange, Stock Exchange of Hong Kong and Shanghai Stock Exchange. Accordingly, the benchmark indices from these stock markets have been selected for the analysis. These selected benchmark indices are FTSE 100, CAC 40®, DAX 30, Nikkei, Hang Seng, Shanghai Composite (SSEC) index, Dow Jones Ind. Avg., NASDAQ Composite (IXIC) , S&P 500 index and NIFTY 50 .The data has been taken from the website of NSE India and the investing.com. The monthly data has been taken from year 2002 to 2023 considering the span of 21 years. The multiple regression model has been used for the data analysis.

Data Analysis

The countries which were selected for the study are India, United Kingdom, France, Germany, Japan, Hongkong, China and United States of America. First of all , the major stock market indices, which are prominent stock indices and also act as the barometer of stock market performance and measure of economic growth of these countries needs to be introduced. The NIFTY 50 is a benchmark Indian stock market index which represents the weighted average of 50 of the largest Indian companies listed on the National Stock Exchange. The Nifty 50 is a diversified 50 stock index representing 13 sectors of the economy. The FTSE 100 is an index made up of shares from the 100 biggest companies by market capitalisation on the London Stock Exchange (LSE). The CAC 40® is an index that tracks the 40 leading shares listed on the Paris Stock Exchange and the index is normally used as an indicator of France's market performance. As the benchmark index for the French market, the CAC 40® is one of most significant national indices of the pan-European stock exchange group, Euronext.

The DAX (Deutscher Aktien Index) is a stock index of Frankfurt Exchange, which is the largest financial exchange in Germany. It represents the 30 biggest and actively traded German companies listed on the Frankfurt Exchange.The Nikkei Index (Nikkei 225) is the most significant Japanese stock market index. It comprises Japan's top 225 companies listed on

the Tokyo Stock Exchange. The Nikkei Index is considered an important measure of the performance of the Japanese economy.

The Hang Seng Index (HSI) is the main indicator of the market performance in Hong Kong. It monitors daily the 50 largest and most liquid stocks listed on the main board of the Stock Exchange of Hong Kong.The Shanghai SE Composite is a major stock market index which represents the performance of all A-shares and B-shares listed on the Shanghai Stock Exchange, in China. The index is capitalization-weighted .

Dow Jones Industrial Average (DJIA) is a widely acknowledged index for stock market which measures the daily stock market movements of 30 U.S. companies listed on the NASDAQ or the New York Stock Exchange (NYSE). These 30 publicly owned companies are counted as leaders in the United States economy.

The Nasdaq Composite Index is a market capitalization-weighted index which is a broad index that is heavily weighted toward the important technology sector. The index is composed of both domestic and international companies. The Nasdaq Composite Index consist of all equity securities listed on the Nasdaq. They comprise common stocks, ordinary shares, American depositary receipts (ADRs), units of real estate investment trusts (REITs), and publicly traded partnerships, as well as tracking stocks.

The S&P 500 Index, or Standard & Poor's 500 Index, is a market-capitalization-weighted index of 500 leading publicly traded companies in the U.S. The index has 503 components because three of them have two share classes listed. It is not an exact list of the top 500 U.S. companies by market cap because of consideration based on other criteria in the index. The S&P 500 index is viewed as one of the best gauges of major American equities' performance, and by expansion, that of the stock market overall.

In this study an attempt has been made to understand the cointegration of stock market performance of different countries amidst globalisation of the markets. The stock market performance of the selected countries has been traced from January 1, 2002 to December 31, 2023.The span of 21 years has witnessed variety of economic upheavals which are expected to be reflected in their stock market performance. It is based on monthly returns of the given indices which makes 263 observations.

The multiple regression model has been selected to test the given hypothesis. The performance of Benchmark Niflty 50 of National Stock Exchange has been taken as dependent variable due to the apparent influence of international developments on the Indian stock markets and economy. And the other nine indices representing European, Asian and US Market have been taken as independent variables.

$H_0 =$ There is no significant relationship between the Indian stock market performance and performance of prominent stock markets in Europe, Asia and America .

Table No.1 Descriptive Statistics

Descriptive Statistics			
	Mean	Std. Deviation	N
Nifty 50	1.3503	6.31014	263
FTSE 100	.2306	3.89544	263
CAC 40	.3294	5.07293	263
DAX 30	.6224	5.77521	263
Nikkei	.6020	5.28142	263
Hang Seng	.3748	6.30465	263
SSEC	.5228	7.18648	263
Dow Jones	.5998	4.25902	263
Nasdaq Composite	.9284	5.39122	263
S&P 500	.6458	4.37996	263

Table No. 2 Correlations

		Nifty 50	FTSE 100	CAC 40	DAX 30	Nikkei	Hang Seng	SSEC	Dow Jones	Nasdaq Composite	S&P 500
Pearson Correlation	Nifty 50	1.000	0.558	0.541	0.551	0.538	0.512	0.302	0.546	0.536	0.568
	FTSE 100	0.558	1.000	0.858	0.805	0.576	0.547	0.254	0.773	0.692	0.779
	CAC 40	0.541	0.858	1.000	0.920	0.639	0.497	0.257	0.815	0.761	0.826
	DAX 30	0.551	0.805	0.920	1.000	0.629	0.489	0.285	0.803	0.775	0.816
	Nikkei	0.538	0.576	0.639	0.629	1.000	0.449	0.303	0.626	0.629	0.652
	Hang Seng	0.512	0.547	0.497	0.489	0.449	1.000	0.524	0.507	0.508	0.526
	SSEC	0.302	0.254	0.257	0.285	0.303	0.524	1.000	0.314	0.297	0.314
	Dow Jones	0.546	0.773	0.815	0.803	0.626	0.507	0.314	1.000	0.848	0.961
	Nasdaq Composite	0.536	0.692	0.761	0.775	0.629	0.508	0.297	0.848	1.000	0.935
	S&P 500	0.568	0.779	0.826	0.816	0.652	0.526	0.314	0.961	0.935	1.000
Sig. (1-tailed)	Nifty 50		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	FTSE 100	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	CAC 40	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000
	DAX 30	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000
	Nikkei	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	Hang Seng	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000
	SSEC	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000
	Dow Jones	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000
	Nasdaq Composite	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	S&P 500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
N	Nifty 50	263	263	263	263	263	263	263	263	263	263
	FTSE 100	263	263	263	263	263	263	263	263	263	263
	CAC 40	263	263	263	263	263	263	263	263	263	263
	DAX 30	263	263	263	263	263	263	263	263	263	263
	Nikkei	263	263	263	263	263	263	263	263	263	263
	Hang Seng	263	263	263	263	263	263	263	263	263	263
	SSEC	263	263	263	263	263	263	263	263	263	263
	Dow Jones	263	263	263	263	263	263	263	263	263	263

| | Nasdaq Composite | 263 | 263 | 263 | 263 | 263 | 263 | 263 | 263 | 263 | 263 |
| | S&P 500 | 263 | 263 | 263 | 263 | 263 | 263 | 263 | 263 | 263 | 263 |

Table No. 3 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.568a	0.323	0.32	5.2036	
2	.621b	0.386	0.381	4.96517	
3	.647c	0.419	0.412	4.83933	
4	.655d	0.43	0.421	4.80262	2.091

a Predictors: (Constant), S&P 500

b Predictors: (Constant), S&P 500 , Hang Seng

c Predictors: (Constant), S&P 500 , Hang Seng, Nikkei

d Predictors: (Constant), S&P 500 , Hang Seng, Nikkei, FTSE 100

e Dependent Variable: Nifty 50

Table No. 5 Coefficients

				Standardized Coefficients	t	Sig.	Confidence Interval for B		Correlations			Collinearity Statistics	
Model				Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	0.822	0.324		2.534	0.012	0.183	1.461					
	S&P 500	0.818	0.073	0.568	11.148	0.000	0.674	0.963	0.568	0.568	0.568	1.000	1.000
2	(Constant)	0.856	0.310		2.764	0.006	0.246	1.465					
	S&P 500	0.595	0.082	0.413	7.220	0.000	0.432	0.757	0.568	0.409	0.351	0.723	1.383
	Hang Seng	0.295	0.057	0.295	5.164	0.000	0.183	0.408	0.512	0.305	0.251	0.723	1.383
3	(Constant)	0.824	0.302		2.731	0.007	0.230	1.419					
	S&P 500	0.393	0.096	0.273	4.104	0.000	0.205	0.582	0.568	0.247	0.194	0.507	1.973
	Hang Seng	0.260	0.057	0.259	4.592	0.000	0.148	0.371	0.512	0.274	0.218	0.704	1.421
	Nikkei	0.290	0.076	0.243	3.834	0.000	0.141	0.439	0.538	0.232	0.182	0.559	1.788
4	(Constant)	0.884	0.301		2.938	0.004	0.291	1.476					
	S&P 500	0.236	0.119	0.164	1.987	0.048	0.002	0.469	0.568	0.123	0.093	0.326	3.064
	Hang Seng	0.229	0.058	0.229	3.962	0.000	0.115	0.343	0.512	0.239	0.186	0.664	1.507
	Nikkei	0.272	0.076	0.228	3.603	0.000	0.123	0.421	0.538	0.219	0.169	0.553	1.809
	FTSE 100	0.282	0.126	0.174	2.230	0.027	0.033	0.531	0.558	0.138	0.105	0.363	2.753
a. Dependent Variable:													

Based on multiple regression model, it has been observed that the performance of Indian stock market which has been represented through NIFTY 50 is positively correlated with the selected indices which adds more risk to the stock market due to international developments. The high degree of cointegration has been found in case of London stock market with US stock market, Stock markets of France and Germany, whereas the trends of 21 years reflect the low level cointegration of London stock market with China and comparatively medium level with India and Japan. The stock market of France is highly cointegrated with stock markets of London, Germany, Japan and America. The stock market of Germany is highly cointegrated with London, France, Japan and America and has impact on Indian Stock market with medium level. The Japanese stock market is highly cointegrated with America, France and Germany. The Hongkong stock market is cointegrated with all selected markets with the similar degree. The China has independent pattern of growth in the stock market and its degree of correlation with other markets in not much significant. The stock market of US is interconnected with all the markets with high degree with the exception of China. The Indian stock market is almost equally cointegrated with all the selected countries except China.

The stepwise multivariate regression has been supported the model which includes stock markets of US, Hongkong, Japan and London for strong cointegration with Indian stock market. The   Sig. Value p in all the given cases is less than 0.05, which denotes that there is a significant cointegration between the performance of Indian Stock market and markets of US, Hong Kong, Japan and London.

Findings & Conclusion

Through several ways, the Indian stock market is linked to other stock markets worldwide. As a result of globalization and technical improvements, this relationship has been stronger over time. Foreign Institutional Investors (FIIs) and Foreign Portfolio Investors (FPIs), correlation with global indices, commodity prices, foreign exchange rates, global investment trends, and the global economic environment are some of the important factors influencing the connection between the Indian stock market and international markets.

The present study has shown that Indian stock market is not independent of Global market volatility. The impact of internation developments will certainly be visible on Indian stock markets the degree of impact may vary with the country and the nature of development. Therefore, a rational investor needs to have overview of economic developments in the countries which have strong impact of the stock returns in Indian stock market.

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