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DYNAMIC EFFECTS OF US AND ASIAN MARKETS ON INDIAN STOCK MARKET

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Abstract *India is one of the emerging markets in Asia and it is considered as an attractive investment destination by individual and institutional investors of national and international, private equity funds, etc. Globalisation has relative impact on movements of stock market valuations world wide with liberalised polices, free-flow of capital, advent of information technology, etc. Market indices indicate depth and potential of returns to attract participants. The motive of this paper is to analyse dynamic effects of the US, China and Hong Kong markets on Indian stock market. This study, using monthly prices of Dow Jones Industrial Average, Hang Seng, Shanghai composite and Nifty indices from April 2003 to October 2018, administered statistical techniques of correlation, co-integration and Vector Error Correction Model (VECM) models to understand long-run and short-run relationship on Indian stock market. This study using Johansen co-integration test found long-term association among Hang Seng, Shanghai, Dow Jones Industrial average and Nifty. Further, statistical analysis of granger causality found a short-run positive influence of Hang Seng (Hong Kong), Shanghai (China) and negative impact of DJIA (US) markets on Indian market. The findings shall be useful for portfolio managers, investors and traders to take market decisions.*

Keywords: *Capital Market, Dynamic Effect, Investment Decisions, Co-Integration*

JEL Classification: *G15*

INTRODUCTION

Financial market is an important mechanism for flow of funds and capital formation leading to economic growth. Capital flow through foreign institutional investors, private equity funds, hedge funds , including foreign direct investment (FDI) are eminent for the inclusive growth of an economy (Kulshrestha, 2014; & Shukla, 2011). Capital market is gaining importance in channelizing small savings into large investments, capital appreciation and protecting investors' interest by ensuing good governance and regulations. The development of information technology, telecommunication and emergence of new international financial institutions offering financial services has accelerated capital flows (Singh, 2015). India's fast economic growth boosted its image as an attractive investment destination to investors including hedge funds, investment bankers, institutional investors and high net worth individuals from different parts of the globe. Investment decisions of these market participants are based on adoption and practice of global policies and standards; therefore, Indian markets with global norms are integrated with the movement of American and Asian stock markets. Many Indian companies export their products and services to global markets, also raising funds by listing on foreign stock exchanges such as New York Stock Exchange (NYSE), London Stock exchange and NASDAQ. The stock price movements of these Indian companies are more likely to get affected by the developments in world trade (Wong et al., 2005). Similarly, bilateral trade of India with the US and other Asian economies also influences on market valuations. The trade between the US and India was USD 142.6 billion with an export and import amounting to USD 58.7 billion and USD 83.9 billion, respectively, during 2018. In the same year, FDI from the US was USD 46 billion, showing an increase of 3.4% from the previous year. Similarly, the Indian FDI at US market was around USD 9.6 billion, showing a decline of 2% from 2017. The FDI from US majorly focussed on financial, insurance, professional services, manufacturing, scientific and technical services (USTR, 2019). The FDIs in India from China stood at USD 1.738 billion and from Hong Kong was USD 632 million during 2018, showing a significant exposure to Indian markets.

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India being one of the emerging economies in Asian continent is becoming an attractive destination for global investors through FDI and also at capital markets. Indian securities market comprising National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) has been facilitating market participants with the adoption of robust technology and stringent regulations of Securities and Exchange Board of India (SEBI). However, the market is subjected to high fluctuations with cross-border capital flows in the form of FDI, foreign institutional investors (FII) and reaction of Indian market to global market cues (Mukherjee, 2007). In addition, Indian markets are majorly influenced by NYSE, NASDAQ, HANG SENG, NIKKEI, DOW JONES, FTSE, S&P 500, Kospi, etc. Moreover, global currencies and commodities also influence the Indian stock markets momentum. However, scholastic studies focusing the impact of US and Asian markets' on Indian stock market returns are limited. This dearth of literature motivated the author to explore dynamic effects of US and Asian stock markets on Indian market returns of NIFTY, being one of the important barometer for understanding momentum of Indian stock market. The remaining part of this paper is presented with: Section 2- reviewing existing literatures on global stock markets on Indian markets, Section 3 - describing methodology, Section 4 - covering data analysis and interpretation and Section 5 - presenting findings and conclusions.

REVIEW OF LITERATURE

The study reviewed scholastic evidences on effect of the US and Asian markets on Indian stock market at national and international reputes. Gjerde and Settem (1995) examined influence of the US market on the performance of stock markets of Japan, the UK, Germany, France, Switzerland, Sweden, Denmark and Norway with a high degree of co-movement among stock price indices. The inter-relationship among stock markets of India, Pakistan and the US was analysed by Iqbal, et al. (2011) and found non-existence of long run relationship. However, Granger Causality indicated the unidirectional causal relationship between New York Stock Exchange to Bombay and Karachi stock exchanges. Mandaviya (2014) analysed the influence of global stock market on Indian stock markets considering global indices such as NYSE, NASDAQ, TOPIX, FTSE 100, HANG SENG, SSE COMPOSITE, DOW JONES, DAX, S&P 500 as independent variables and Nifty and Sensex as dependant variables. The findings indicated the influence of independent variables on dependant variables. Singh (2015) revealed unidirectional short-term causal influence from Indian stock markets to Japanese and Hong-Kong. It is also found that long-term relationships did not exist between the Indian, Japanese and Hong Kong market over the study period. Sharkasi et al. (2005) investigated the price interdependence between Irish, the UK, Portuguese, the US, Brazilian, Japanese and Hong Kong, based on the wavelet analysis. The results revealed significant effects from the UK and Portuguese markets on the US and Brazilian markets. While, the US and Brazilian markets influence the Asian markets, Japan and Hong Kong impact the European market.

Globally, stock markets are integrated after the globalisation (Sakthivel & Kamaiah, 2012) and liberalisation policies (Mukherjee and Bose, 2008). The integration between the markets leads to movement of stock prices in tandem. Trade and investment relation among different countries influences the governance of international markets and co-movement of stock prices. Information related to economic conditions of a country is transmitted to other country creating an impact on stock market (Sakthivel and Kamaiah, 2012). International financial market liberalisation policies are important national policy decisions in the globalised business impacting on domestic stock market integration (Chattopadhyay & Behera, 2006). Stock markets of the US, the UK, Japan, China and Hong Kong are observed with short-run impact on Indian stock markets (Wong et al., 2005; Tripathi and Sethi, 2010; Goyal and Bansal, 2019; Chattopadhyay and Behera, 2006). The US stock market plays an important role in the international stock markets (Eun & Shim, 1989) and it has a positive correlation among Indian, the US, certain European and Asian stock markets (Sakthivel & Kamaiah, 2012).

The studies of Bracker (1999); Pretorius (2002); Johnson (2003); Colthup (2005) focussed on factors influencing spillover information on national stock markets globally. In addition, stock market crisis by Pretorius (2002) and Colthup (2005) observed bilateral trade, variation in inflation rates, interest rate, stock market size are certain factors affecting the spillover of information among the markets. Johnson (2003) revealed the positive influence of high share trade with the US, however, increased bilateral exchange rate fluctuation found reverse effect on co-movements of market. The studies of Agmon (1972); Hilliard (1979); Becker et al. (1990) and Hamao et al. (1990) focussed on understanding the correlation between the US, the UK, Germany and Japan and found a lower correlation and integration between markets. Further, studies of Arshanapalli et al. (1995); Liu et al. (1998); Lee, (2004); Bose and Mukherjee (2006); Click and Plummer (2005); Janor et al. (2007) focused on the level of integration between the emerging Asian markets with the developed economies and the results indicated regional integration between the Asian markets. The financial market crash during 1987 revealed the influence of several stock

markets of the world indicating co-movement with US markets (Eun & Shim, 1989). Impulsive response function revealed no significant changes in the Indian market towards the changes in the Asian market. However, the significant relationship between the Indian and Asian market has been found at financial crisis (Bahng, 2003). Gangadharan and Yoonus, (2012) analysed the existence of co-integration and relationship between the stock indices of India and the US for the pre-crisis, crisis and post-crisis period. The study found no co-integration between Indian and the US stock market. Adas and Tussupova (2016) examined the influence of global financial crisis on the stock markets of China, Japan, India and the US. After the financial crisis, bidirectional influence was noticed in the US stock market with other markets. Hamao (1990); Christofi (1999); Kim (2005); Wang (2005); Baur and Jung (2006) investigated volatility effects among developing and emerging economies of European, American and Asian equity markets with the US and found a unidirectional volatility from the US and other countries. The intraday equity return of Indian market has an influence on intraday volatility spillover of Korea, Pakistan, Singapore and Taiwan. In addition, it has a significant impact on intraday equity of Philippines and Sri Lanka. Hence, the fluctuation in foreign market not only creates an impact on domestic market but also on the returns of domestic market (Mukherjee & Mishra, 2010).

The impact of stock markets of the US, Japan and Asia Pacific stock markets are noticed by Cheung and Mak, (1992); Palamalai, (2013); Srinivasan and Kalaivani, (2013); Click and Plummer (2005) and the influence of European, the US and Asian and Asia Pacific stock markets studied by Sakthivel and Kamaiah (2012); Eun and Shim (1989). Premaratne and Bala, (2003) studied the movement of stock markets at Hong Kong, the US, Japan, Australia and the UK. The impact of Japanese stock market with Australia, China, Hong Kong, Malaysia, New Zealand and Singapore is evidenced through the scholastic literature of Johnson and Soenen, (2002). Scholastic literatures pertaining to the impact of Chinese and Japan markets on Indian stock market indices are studied by Megaravalli et al. (2018); Shilpa and Bansal, (2018). Chopra, (2019) assessed sensitivity analysis of Indian stock market using GARCH model and found existence of volatility before the recession due to excessive leverage effect. Rajkumar (2015) investigated relationship between Indian stock market with Indonesia, Malaysia and Singapore of ASEAN countries. The empirical results of Granger causality and co-integration found significant short-term relationship and absence of a long-term relation. Samadder and Bhunia, (2018) examined short- and long-run relationship of Indian stock market with Australia, Canada, France, Germany, the UK and the US. The Johansen co-integration shows long-run equilibrium relation among all the selected stock markets. In addition, the Granger causality test with VECM found a long-run relation between Indian and US stock markets whereas a short-run relation among France, Germany and the UK. Kumar et al. (2020) studied on stock market returns and mutual funds' assets under management. This study using multiple regression analysis finds non-existence of relationship between stock market returns and mutual fund flows. Jagotra et al. (2019) attempted co-integration of stock prices and macroeconomic variables. The study found co-integration of macro-economic variables and banking stocks with positive to industrial growth and negative to money supply. The above scholastic evidences focussed on different stock markets of world wide; however, the influence of the US, China and Hong Kong on Indian market is limited and there is dearth of research studies considering the latest and longer duration of market data to have a comprehensive understanding. This research gap motivated to explore and add new insights to the existing capital market domain of knowledge.

Objective

The objective is to understand long and short-run dynamic effects of US and leading Asian markets on Indian stock market.

METHODOLOGY

This study based on empirical data evaluated impact of the US and Asian stock market on Nifty, Indian market indices using secondary data for a period of 15 years. The study used monthly data from April 2003 to October 2018 and analysed the dynamic effect. The study considering global indices such as Dow Jones Industrial Average (DJIA) - USA, Hangseng – Hong Kong, Shanghai Composite - China as independent variables and Nifty as dependent variable. Secondary data has been sourced from the websites of New York Stock exchange, Hong Kong stock exchange, Shanghai stock exchange and National Stock exchange. The study administered E-views statistical package for data analysis and interpretation. Initially, the study employed correlation technique to explore relationship among dependant and independent variables at the level. Considering the existence of relationship used Augmented Dickey Fuller (ADF) test to convert the variables into stationarity. Data's stationarity has been verified with the following regression equation:

$$\Delta y_t = a + \alpha y_{t-1} + \sum_{i=1}^{k} b_i \Delta y_{t-i} + \varepsilon_t \quad (1)$$

$$\Delta y_t = a + \beta t + \alpha y_{t=1} + \sum_{i=1}^{k} b_i \, \Delta y_{t-i} + \varepsilon_t \quad (2)$$

The test for unit root in where is the lagged difference to accommodate serial correlation in the errors, is the appropriate lag length.

The null and alternate hypotheses are:

H_0: $\alpha = 0$.

H_1: $\alpha < 0$.

The series shall be non-stationery, if there is a presence of unit root due to not rejecting the null hypothesis. In case of equation (1), the series shall be mean stationery process, if the null hypothesis is rejected; whereas, for equation (2) the series shall be trend stationery process. The series is called differenced stationery process if ΔYt is stationary. Yt is called as integrated of first-order I(1) if ΔYt is stationary and *Yt* is not.

Further, the study identified lag order using Akaike information lag order-selection criteria. Subsequently, Johansen co-integration tests have been administered to ascertain the existence of long-run association between dependant and independent variables at level. As the variables are found to be co-integrated, a Vector Auto Regression model with Vector Error Correction Model has been used to understand the causality.

The co-integrating equation is:

$$y_{2,t} = \beta y_{1,t} \quad (3)$$

The corresponding VEC model is

$$\Delta y_{1,t} = \alpha_1 \left(y_{2,t-1} - \beta y_{1,t-1} \right) + \epsilon_{1,t} \quad (4)$$

$$\Delta y_{2,t} = \alpha_2 \left(y_{2,t-1} - \beta y_{1,t-1} \right) + \epsilon_{2,t} \quad (5)$$

The coefficient α_i measures the speed of adjustment of the i-th endogenous variable towards the equilibrium.

The study using Wald test examined significance of explanatory variables in a model with the following formula:

$$W_t = \frac{[\hat{\theta} - \theta_0]^2}{1/I_n(\hat{\theta})} = I_n(\hat{\theta})[\hat{\theta} - \theta_0]^2 \quad (6)$$

Where:

$\hat{\theta}$ = Maximum Likelihood Estimator (MLE)

$I_n(\hat{\theta})$ = expected Fisher information (evaluated at the MLE).

The developed model has been validated using residual diagnostic tests such as serial correlation LM test, heteroskedasticity test and test of normality. Further, impulsive response function has also been used to understand dynamic effects under conditional environment. Subsequently, stability of the regression model was analysed using CUSUM test.

DATA ANALYSIS AND INTERPRETATION

This study investigated the co-integration and causal relationship between the US, Asian and Indian stock markets namely, DJIA, Hangseng, Shanghai Composite and Nifty indices. The results of statistical techniques are analysed and interpreted as under.

Correlation

The study used correlation analysis to test existence of primary relationship between selected variables. Accordingly, all independent variables have a relationship between dependant variable, Nifty at 0.57868 of Shanghai, 0.88081 of Hang Seng and 0.91737 of DJIA. This motivated further statistical analysis.

Test of Stationarity

The study considering indices of Hong Kong– Hang Seng, China-Shanghai composite and US - DJIA and Nifty as variables used Augmented Dickey Fuller test to convert primary data into stationarity. The results revealed that DJIA and Nifty were not stationary with P value of 0.9964 and 0.8498 at level. However, they became stationary at the first difference with P value of 0.0000. Hang Seng and Shanghai composite indices were stationary at the level with a P value of 0.0000 and 0.0125, respectively.

Lag Order Selection Criteria

The study used VAR Lag Order Selection Criteria and identified appropriate lag order as 6, based on Akaike information criterion (AIC) with a value of 59.06909.

Co-Integration

The study examined co-integration between Hang Seng, Shanghai composite, DJIA and Nifty by employing Johansen co-integration test. The result shown in Table 1 indicates the P value (0.0212) less than general acceptance level of 0.05; hence, null hypothesis is rejected. Accordingly, it is found an existence of co-integration among Hang Seng, Shanghai composite, DJIA and Nifty indicating long-run association.

Table 1: Unrestricted Co-Integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigen Value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.155378	30.39599	27.58434	0.0212
At most 1	0.073062	13.65635	21.13162	0.3939
At most 2	0.044329	8.161468	14.26460	0.3625
At most 3	0.008806	1.592121	3.841466	0.2070

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: Statistical Output

Vector Auto Regression Estimate

Based on the existence of co-integration, the study administered VECM model under VAR environment. Accordingly, it is found that one percent change in Shanghai index leads to 2.08% impact on Nifty. Similarly, one percent change in Hong Kong market leads to 0.07% impact on Nifty, whereas, opposite reaction has been found with the US and Nifty index to the extent of 0.14%. The co-efficient (C1) is positive with a P value of 0.0436; showing non-existence of long-run relationship among DJIA, Shanghai Composite, Hang Seng and Nifty. The study leads to development of following equation –

$$
\begin{aligned}
(NIFTY) = {} & 0.0337857905241 * (NIFTY(-1) - 0.141878272127 * DJIA(-1) \\
& + 0.0778151496094 * HNGSNG(-1) - 2.08989633433 \\
& * SHNGAICOMP(-1) + 148.497698986) - 0.170670174725 \\
& * D(NIFTY(-1)) - 0.27318292141 * D(NIFTY(-2)) \\
& + 0.0476387673184 * D(NIFTY(-3)) + 0.103235337014 \\
& * D(NIFTY(-4)) - 0.205444243056 * D(NIFTY(-5)) \\
& - 0.190428270684 * D(NIFTY(-6)) - 0.0586150554899 \\
& * D(DJIA(-1)) - 0.12688914731 * D(DJIA(-2)) - 0.0240067176743 \\
& * D(DJIA(-3)) - 0.106154550801 * D(DJIA(-4)) \\
& + 0.00958419867931 * D(DJIA(-5)) - 0.0548814832597 \\
& * D(DJIA(-6)) + 0.0847318709752 * D(HNGSNG(-1)) \\
& + 0.0507895894043 * D(HNGSNG(-2)) + 0.0252970627664 \\
& * D(HNGSNG(-3)) - 0.0604650869032 * D(HNGSNG(-4)) \\
& + 0.0550360168195 * D(HNGSNG(-5)) + 0.0601489922062 \\
& * D(HNGSNG(-6)) - 0.105722722826 * D(SHNGAICOMP(-1)) \\
& + 0.45541884775 * D(SHNGAICOMP(-2)) - 0.0626884736033 \\
& * D(SHNGAICOMP(-3)) + 0.235309799712 * D(SHNGAICOMP(-4)) \\
& + 0.0438121333025 * D(SHNGAICOMP(-5)) - 0.0831076024381 \\
& * D(SHNGAICOMP(-6)) + 94.0537923035
\end{aligned}
$$

VEC Granger Causality/Block Exogeneity Wald Tests

The study used Granger causality to understand short-run impact of independent on dependant variables of indices under VAR platform. The hypotheses considered and tested are as under:

- Ho: Hang Seng – Hong Kong index does not influence Nifty in the short run.
- Ho: Shanghai composite – China index does not impact Nifty in the short term.
- Ho: DJIA – US index does not have a short run impact on Nifty.

Table 2: VEC Granger Causality/Block Exogeneity Wald Tests

Dependent Variable: D(NIFTY)			Prob.
Excluded	Chi-sq	df	
D(HNGSNG)	15.39763	6	0.0174
D(DJIA)	7.223171	6	0.3007
D(SHNGAICOMP)	18.77021	6	0.0046
All	45.59290	18	0.0003

Source: Statistical Output

The results in Table 2 found that the P value of Hang Seng (0.0174) and Shanghai composite index (0.0046) is lesser than the general acceptance level of 0.05. Hence, null hypothesis is rejected and finds the short-run influence of Hang Seng and Shanghai composite indices on Nifty. However, the P value of DJIA (0.3007) is more than acceptance level of 0.05; therefore, it cannot reject null hypothesis and accepts that DJIA does not influences Nifty in the short run.

Table 3: Short Run Impact on Hong Kong Market

Dependent Variable: D(HNGSNG)			
Excluded	Chi-sq	df	Prob.
D(NIFTY)	16.74092	6	0.0103
D(DJIA)	2.854618	6	0.8269
D(SHNGAICOMP)	16.78633	6	0.0101
All	38.33440	18	0.0035

Source: Statistical Output

Table 3 shows that Nifty and Shanghai composite influences on Hong Kong, whereas, DJIA does not. Similarly, Table 4 depicts Nifty, Shanghai composite and Hang Seng does not influence DJIA in the short run.

Table 4: Short Run Impact on US Market

Dependent variable: D(DJIA)			
Excluded	Chi-sq	df	Prob.
D(NIFTY)	5.342729	6	0.5007
D(HNGSNG)	8.624605	6	0.1958
D(SHNGAICOMP)	9.060935	6	0.1702
All	29.57165	18	0.0418

Source: Statistical Output

Table 5: Short Run Impact on China Market

Dependent Variable: D(SHNGAICOMP)			
Excluded	**Chi-sq**	**df**	**Prob.**
D(NIFTY)	10.07962	6	0.1213
D(HNGSNG)	16.81306	6	0.0100
D(DJIA)	4.126460	6	0.6596
All	23.55879	18	0.1700

Source: Statistical Output

It can be observed from Table 5 that Nifty and DJIA do not influence Shanghai composite in the short run; conversely, Hang Seng has a short-run impact on Shanghai composite index.

Residual Diagnostic Test- Serial Correlation

The study used Breusch-Godfrey Serial Correlation LM Test to check the existence of serial correlation of selected variables. Accordingly, the results as shown in Table 6 find non-existence of serial correlation with P value 0.7824.

Table 6: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.207796	Prob. F(2,152)	0.8126
Obs*R-squared	0.490806	Prob. Chi-Square(2)	0.7824

Source: Statistical Output

Test of Heteroskedasticity

Heteroskedasticity of selected variables has been tested by applying Breusch-Pagan-Godfrey test, accordingly, finds that residuals are not heteroscedastic (Table 7).

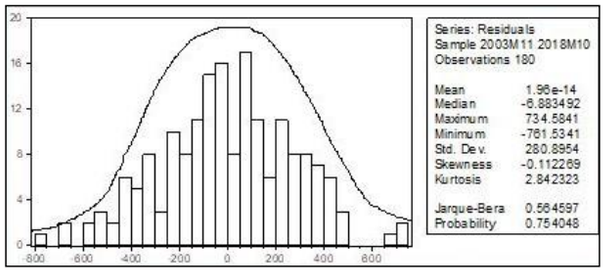
Table 7: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.773867	Prob. F(28,151)	0.7838
Obs*R-squared	22.58835	Prob. Chi-Square(28)	0.7534
Scaled explained SS	15.23059	Prob. Chi-Square(28)	0.9759

Source: Statistical Output

Test of Normality

The study using Jarque Bera test finds that residuals are normally distributed considering the test statistic (0.754048) with P value of 0.564597. It is also found that the statistics fulfils the requirement of a bell shape curve (Fig. 1).



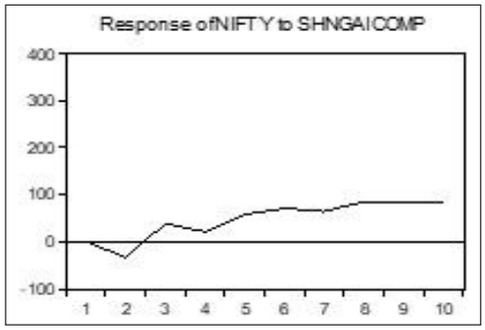
Source: Statistical Output

Fig. 1: Normality Test Results

The aforementioned residual diagnostics tests of serial correlation, normality and heteroskedasticity are found to be satisfactory for accepting the developed VECM model. This study, therefore, administered impulsive response function to understand the dynamic effects of the US and Asian stock market on Nifty.

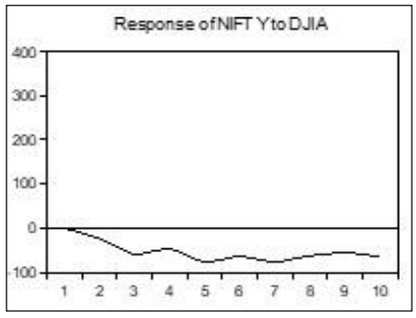
Impulse Response Function

The Impulse Response system has been used to understand dynamics of the US and Asian markets on Nifty under conditional environments and shown in following figures –



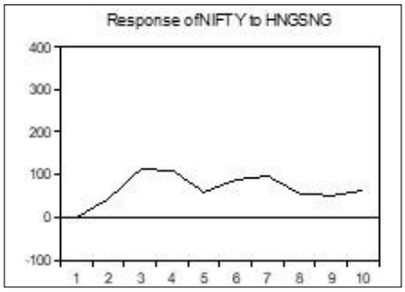
Source: Statistical Output

Fig. 2: Response of Nifty to Shanghai Composite



Source: Statistical Output

Fig. 3: Response of Nifty to DJIA



Source: Statistical Output

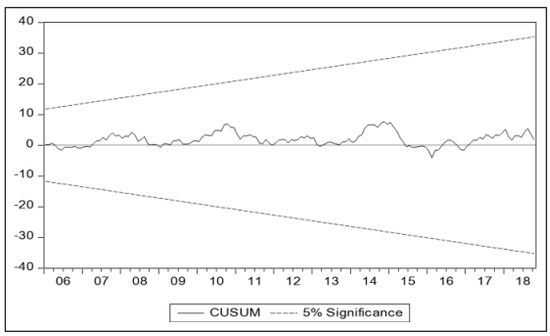
Fig. 4: Response of Nifty to Hangseng

The aforementioned Fig. 2 represents that one standard deviation shock on Chinese (Shanghai composite) index led to negative movement for the first two months and upward movement is observed in the following month, subsequently there is a slight correction and upward movement from fourth month with a positive note. Fig. 3 depicts that one standard deviation shock on US index (DJIA) leads to negative impact on Nifty index over a period of ten months. Similarly, Fig. 4 shows one standard deviation shock on Hong Kong (Hang Seng) market leads to upward movement in the first three months and corrections up to fifth month. Subsequently, Nifty reaction was steady upward and downward.

The study finds any change in China and Hong Kong market has positive impact on Nifty, i.e., Indian stock market, whereas, US (DJIA) market momentum leads to negative impact on Nifty index over a period.

Stability of Model

The stability of regression model was checked by applying CUSUM test. The results of test represented in Fig. 5 reveals that, the selected variables are stable indicating the significance of developed model. The curved line lies within the level of significance (5%); therefore, the regression model developed is statistically acceptable.



Source: Statistical Output

Fig. 5: CUSUM Test

FINDINGS AND CONCLUSIONS

India has bilateral investments across developed economies including the US, China and Hong Kong. Capital flow by way of investments through FDI and in equity shall lead to momentum in stock market indices. The US and Hong Kong have a significant exposure towards India's FDI and equity segment than China. However, in the recent developments China is negotiating with India in expanding their investment proposals. This study using indices of the US, China and Hong Kong measured the dynamic effects on Indian stock market, (Nifty). Accordingly, the study finds co-integration based on Johansen test of statistics among Hong Kong, China, the US and India with the emerging globalisation policies indicating a long-run association. The VECM estimates with VAR Granger causality indicates an existence of short-run influence of Hang Seng (Hong Kong), Shanghai (China) and DJIA (US) markets on Indian stock market indices (Nifty). Hence, any movements in US and Asian markets shall have corresponding effect on Indian market returns. In addition, this study analysed short-run impact on Hong Kong market by India, the US, China and found that Hong Kong market is influenced by India and China rather than the US market. Similarly, the study also finds no impact of India, China and Hong Kong on the US market in the short run. Hence, any impact on these Asian markets does not affect the valuations at US market. However, any positive momentum at Hong Kong and China leads to positive impact on Nifty, whereas, the US – DJIA has negative impact of Nifty in the short run based on secondary data used in this study. These findings of short- and long-run impact of Asian and the US markets shall show the direction of movements of Indian market (Nifty) and facilitates in trading and investment decisions in general. Moreover, this study contributes for short-term trading decisions at Nifty considering short-run impact of selected markets. This study analysed monthly data of the US and selected Asian markets for 15 years; however, further research considering daily/weekly data to evaluate impact of other Asian Markets with Exchange rate, US dollar index and GDP on Indian Stock market may be undertaken for comprehensive understanding of impacts.

REFERENCES

Journals

Adas, C. G., & Tussupova, B. (2016). Impact of the global financial crises on the major Asian countries and USA stock markets and inter-linkages among them. *Int. J. Econ. Sci., 5,* 1-17. Retrieved from https://doi.org/10.20472/ES.2016.5.1.001

Agmon, T. (1972). The relations among equity markets: A study of share price co-movements in the United States, United Kingdom, Germany and Japan. *The Journal of Finance, 27*(4), 839-855.

Arshanapalli, B., Doukas, J., & Lang, L. H. P. (1995). Pre and post October 1987 stock market linkages between US and Asian markets. *Pacific Basin Finance Journal, 3,* 57-73.

Bahng, S. (2003). The response of the Indian stock market to the movement of Asia's emerging markets: From isolation toward integration? *Glob. Econ. Rev., 32,* 43-58. Retrieved from https://doi.org/10.1080/12265080308422917

Baur, D., & Jung, R. C. (2006). Return and volatility linkages between the US and the German stock market. *Journal of International Money and Finance, 25*(4), 598-613.

Becker, K. G., Finnerty, J. E., & Gupta, M. (1990). The intertemporal relation between the US and Japanese stock markets. *The Journal of Finance, 45*, 1297-1306.

Bracker, K. A., Docking, D. S., & Koch, P. D. (1999). Economic determinants of evolution in international stock market integration. *Journal of Empirical Finance, 6,* 1–27.

Chattopadhyay, S. K., & Behera, S.R. (2006). Financial Integration for Indian Stock Market, Working Paper. 8th Annual Conference on Money and Finance in the Indian Economy, IGIDR, 1-29. Retrieved from http://www.slideshare.net/Zorro29/financial-integration-for-indian-stock-market

Cheung, Y. L., & Mak, S. (1992). The international transmission of stock market fluctuation between the developed markets and the Asian - Pacific markets. *Appl. Finance. Econ., 2,* 43-47. Retrieved from https://doi.org/10.1080/758527545

Christofi, A., & Pericli, A. (1999). Correlation in price changes and volatility of major Latin American stock markets. *Journal of Multinational Financial Management, 9,* 79-93.

Click, R. W., & Plummer, M. G. (2005). Stock market integration in ASEAN after the Asian financial crisis. *J. Asian Econ., 16,* 5-28. Retrieved from https://doi.org/10.1016/j.asieco.2004.11.018

Eun, C. S., & Shim, S. (1989). International transmission of stock market movements. *Journal of Financial and Quantitative Analysis, 24*(2), 241-256. Retrieved from https://doi.org/10.2307/2330774

Gangadharan, S. R., & Yoonus, C. A. (2012). Global financial crisis and stock market integration: A study on the impact of global financial crisis on the level of financial integration between the us and Indian stock markets. *Asia-Pac. J. Manag. Res. Innov., 8,* 101-110. Retrieved from https://doi.org/10.1177/2319510X1200800203

Rajkumar, G. S. (2015). Linkages between India and three ASEAN stock markets: A co-integration approach. *Journal of Commerce and Accounting Research, 4*(1), 26-34.

Gjerde, O., & Settem, F. (1995). Linkages among European and world stock markets. *The European Journal of Finance, 1*(2).

Hamao, Y., R., Masulis, & Ng, V. (1990). Correlations in price changes and volatility across international stock markets. *Review of Financial Studies, 3,* 281-307.

Hansda, A. K., & Ray, P. (2002). BSE and Nasdaq: Globalisation, information technology and stock prices. *Economic and Political Weekly, 37*(5), 459-468.

Hilliard, J. (1979). The relationship between equity indices on world exchanges. *The Journal of Finance, 34,* 103-114.

Iqbal, A., Khalid, N., & Rafiq, S. (2011). Dynamic interrelationship among the stock markets of India, Pakistan and United States. *International Journal of Economics and Management Engineering, 5*(1).

Janor, H., Ali, R., & Shaharudin, R. S. (2007). Financial integration through equity markets and the role of exchange rate: Evidence from ASEAN-5 countries. *Asian Academy of Management Journal of Accounting and Finance, 3*(1), 77-92.

Johnson Robert, A., & Soenen, L., (2003). Economic integration and stock market co-movement in the Americas. *Journal of Multinational Financial Management, 13,* 85-100.

Johnson, R., & Soenen, L. (2002). Asian Economic Integration and Stock Market Comovement. *J. Financ. Res., 25,* 141-157. Retrieved from https://doi.org/10.1111/1475-6803.00009

Kim, S. J. (2005). Information leadership in the advanced Asia-pacific stock markets: Return, volatility and volume information spillovers from the U.S. and Japan. *Journal of the Japanese & International Economies, 19*(3), 338-365.

Kulshrestha, H. (2014). Impact of foreign institutional investors (FII's) on Indian capital market. *IMPACT: International Journal of Research in Business Management, 2*(3), 35-52

Kumar, P., Saxena, C., & Gupta, A. (2019). A study on relationship between stock market returns & mutual fund flows. *Journal of Commerce and Accounting Research, 9*(1).

Lee, H. S. (2004). International transmission of stock market movements: A wavelet analysis. *Applied Economics Letters, 11,* 197-201.

Liu, Y. A., Pan, M. S., & Shieh, J. C. P. (1998). International transmission of stock price movements: Evidence from the U.S. and five Asian Pacific markets. *Journal of Economics and Finance, 22,* 59-69.

Mandaviya, J. (2014). Indian stock market influenced by global stock market- a study of select world major stock markets. *Samzodhana - Journal of Management Research, 2*(1).

Megaravalli, A. V., Sampagnaro, G., & Murray, L. (2018). Macroeconomic indicators and their impact on stock markets in ASIAN 3: A pooled mean group approach. *Cogent Econ. Finance.* Article 1432450. Retrieved from https://doi.org/10.1080/23322039.2018.1432450

Mukherjee, D. (2007). Comparative analysis of Indian stock market with international markets. *Great Lakes Institute of Management, 1.*

Mukherjee, K. N., & Mishra, R. K. (2010). Stock market integration and volatility spillover: India and its major Asian counterparts. *Res. Int. Bus. Finance, 24,* 235-251. Retrieved from https://doi.org/10.1016/j.ribaf.2009.12.004

Mukherjee, P., & Bose, S. (2008). Does the stock market in India move with Asia? A multivariate cointegration-vector autoregression approach. *Emerg. Mark. Finance Trade, 44,* 5-22.

Ng, A. (2000). Volatility spillover effects from Japan and the US to the Pacific-Basin. *J. Int. Money Finance, 19,* 207-233. Retrieved from https://doi.org/10.1016/S0261-5606(00)00006-1

Chopra, N. (2019). Sensitivity analysis using Garch model: Evidence from Indian stock market. *Journal of Commerce and Accounting Research, 8*(2), 39-47.

Palamalai, S., Kalaivani, M., & Devakumar, C. (2013). Stock market linkages in emerging Asia-pacific markets, *SAGE Open.*

PhD Research Bureau. (2018). India-China trade relationship: The trade giants of past present and future. Retrieved from https://www.phdcci.in/wp-content/uploads/2018/11/India-China-Trade-Relationship_The-Trade-Giants-of-Past-Present-and-Future.pdf.

Premaratne, G., & Balasubramanyan, L. (2003). Stock market volatility: Examining North America, Europe and Asia. *SSRN Electronic Journal.* Retrieved from https://doi.org/10.2139/ssrn.375380

Pretorius, E. (2002). Economic determinants of emerging stock, market interdependence. *Emerging Markets Review, 3*(2002), 84-105.

Sakthivel, P., & Kamaiah, B. (2012). Interlinkages among Asian, European and the U.S stock markets: A multivariate cointegration analysis. *Journal of Economics and Behavioral Studies, 4*(3).

Sakthivel, P., Bodkhe, N., & Kamaiah, B. (2012). Correlation and volatility transmission across international stock markets: A Bivariate GARCH analysis. *Int. J. Econ. Finance 4,* p. 253. Retrieved from https://doi.org/10.5539/ijef.v4n3p253

Shahzad, S. J. H., Ahmed, T., Rehman, M. U., & Zakaria, M. (2014). Relationship between developed, emerging and South Asian equity markets: Empirical evidence with a multivariate framework analysis, MPRA Paper.

Sharkasi, A., Ruskin, H. J., & Crane, M. (2005). Interrelationships among international stock market indices: Europe, Asia and the Americas. *International Journal of Theoretical and Applied Finance, 8*(5), 603-622.

Shilpa & Bansal, A. (2018). Interlinkages between Indian and Chinese stock markets. *Int. J. Manag. Stud. 5,* 41. Retrieved from https://doi.org/10.18843/ijms/v5i1(4)/06

Shukla, D. R. K., Upadhyaya, A., & Jain, S. (2011). FII equity investment and Indian capital market - An empirical investigation, pp. 62-69.

Jagotra, S., Singh, H., & Singh, A. (2019) Co-Integration among stock prices and macroeconomic variables in India - A banking sector perspective. *Journal of Commerce and Accounting Research, 8*(2), 1-8.

Siddiqui, S. (2009). Stock markets integration: Examining linkages between selected world markets. *Vision: J. Bus. Perspect., 13,* 19-30. Retrieved from https://doi.org/10.1177/097226290901300103

Singh, P., Kumar, B., & Pandey, A. (2010). Price and volatility spillovers across North American, European and Asian stock markets. *Int. Rev. Financ. Anal., 19,* 55–64. Retrieved from https://doi.org/10.1016/j.irfa.2009.11.001

Singh, R. G. (2015). An empirical investigation of linkages between India and major Asian stock markets. *The Indian Journal of Commerce, 68*(1), 30-39.

Srinivasan, P., & Kalaivani, M. (2013). Stock market linkages in emerging Asia-Pacific markets, SAGE Open. Retrieved from https://doi.org/10.1177/2158244013514060.

Samadder, S., & Bhunia, A. (2018). Integration between Indian stock market and developed stock markets. *Journal of Commerce and Accounting Research, 7*(1), 13-23.

Tripathi, V., & Sethi, S. (2010). Integration of Indian stock market with major global stock markets. *Asian Journal of Business and Accounting, 3*(1), 117-134.

Wang, Y., Gunasekarage, A., & Power D. M. (2005). Return and volatility spillovers from developed to emerging capital markets: The case of South Asia.

Wong, W., Penm, J., Terrell, R. D., & Lim, K. Y. C. (2004). The relationship between stock markets of major developed countries and Asian emerging markets. *Journal of Applied Mathematics and Decision Sciences, 8*(4), 201-218.

Wong, W. K., Agarwal, A., & Du, J. (2005). Financial integration for India stock market, a fractional co-integration approach, Department of Economics. Working Paper No. 0501, National University of Singapore, http://nt2.fas.nus.edu.sg/ecs/pub/wp/wp0501.pdf

Proceedings at Conferences

Colthup, G., & Zhong, M. (2005). *Analyses of equity market linkage in the pacific basin.* AFAANZ Conference Paper. Retrieved from http://www.afaanz.org/web2005/papers/colthupg-FIN.pdf

Bose, S., & Mukherjee, P. (2006). *A study of interlinkages between the Indian stock market and some other emerging and developed markets.* Paper presented at the 9th Capital Markets Conference, Indian Institute of Capital Markets, Mumbai, India

Websites

Consulate General of India-Hong Kong. (2019). India-Hong Kong Bilateral Relations. Retrieved from http://www.cgihk.gov.in/page/india-hong-kong-relation/

USTR. (2019). India - United States Trade Representative. Retrieved from https://ustr.gov/countries-regions/south-central-asia/india