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TESTING FINANCIAL INTEGRATION BETWEEN STOCK MARKET OF INDIA AND JAPAN: AN EMPIRICAL STUDY

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Abstract

Growth of a country is dependent upon several factors like economic condition, financial environment, institutional infrastructure and also most importantly the growth of Industries in the country and growth of the industries is basically depended upon climate of capital market of the country because this market actually provides an element which is most important for the success and failure of every industry i.e., funds. The present paper tries to analyse the scope of financial integration between Indian stock market (NSE) and Japanese stock market (Tokyo Exchange) by taking daily closing index of NSE and TSE. This paper further made an attempt to explore existence of dynamic inter-linkages and causal relationship between the Indian Stock Market (NSE) and Japanese stock market (Tokyo Exchange). Tokyo Securities Market being 4th largest exchange in the global stock market and the largest in Asia too. In line with this, India is also having sophisticated stock exchange which is National Stock Exchange. It is the finest and most advanced and automated exchange of the world too which is ranked 12th in the world. We applied ADF test for stationarity of data series and found stationary at first difference. Descriptive statistics showed NSE market provide little bit higher returns than TSE market. Correlation between NSE and TSE indices is coming out to be +0.804784. Testing results of Granger Causality explained that TSE Ganger causes return at NSE and NSE also Granger causes return at TSE. We examined Co-integration and found a co-integration relationship between NSE and TSE. Therefore, during the study we found an evidence of financial integration between the market of India and Japan.

Keywords: India-Japan Inter-relationship, Stock Market, Co-Integration, Causal Relationship, Financial Integration

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1. Introduction

Growth of a country is dependent upon several factors like economic condition, financial environment, institutional infrastructure and also most importantly the growth of Industries in the country and growth of industries is basically depend upon climate of capital market of the country because this market is actually provides an element which is most important for the success and failure of every industry i.e., funds. Funds work as a life blood for an industry, more particularly for a company. The capital market helps the companies to raise funds for satisfying their fund requirement need. Basically capital market of a country works as a channel for creating demand and supply of the debt and equity capital. It's always been a key part of overall financial system of every economy. On one hand primary market helps raising the funds for long-term requirements of corporates and institution and on the other, secondary market provides buying and selling the securities already issued in primary market and hence provide liquidity to investors. This market not only boost growth of different sectors of economy but also channelize the surplus funds (savings) to the deficient fund (borrowings) units of society and thereby enables the optimum allocation of capital resource scarce in nature thus provide the long-term funds for sustainable economic growth. As we know that, a sound and efficient stock market is now need of the hour for increasing growth of economy manifold therefore, the focus has been shifted now on establishment of variables which actually help in determining stock returns.

Today the economies of the world are now connected to each other and this is the result of openness and connectivity that when an event happens in one particular economy, it leads to have an effect on other economies of the world too. The effect of one economy's event on another is dependent upon the fact that how strong these economies are connected with each other. Today the trade and investments restrictions are being narrowed down in order to enable the investors to make an investment not only in their own country but their chosen country too. This give rise to the international diversification of investments but before making an investment in a country we need to see that how the other country is connected to us.

This paper made an attempt to explore existence of dynamic inter-linkages and causal relationship between Indian stock market (NSE) and Japanese stock market (Tokyo Exchange). The reason why we tested the relationship between them is the friendship between India and Japan, which has a long rooted history in spiritual affinity and strong civilizational and cultural ties. The contact documented between Japan and India can be traced with Todaiji Temple (Nara), where towering statue consecration of Lord Buddha

was performed by an Indian Monk, named Bodhi Sena, in 752 AD. Swami Vivekananda, Rabindranath Tagore, Netaji Subhash Chandra Bose, Gurudev, JRD Tata these were the prominent Indians which were associated with Japan in contemporary period. In 1903, India Japan Association was set up and it is said to be one of the oldest international friendship bodies which is situated in Japan till date. Over the years, Japan and India built strong values system and both the countries have created a partnership based on pragmatism and the principle. Fact that India and Japan both are Asian countries, as per the recent regard, India is not only the largest democracy of Asia but the World too and Japan is considered as most prosperous country in Asia. In 1991, Japan was among those countries that basically unconditionally bailed out India from the crisis of balance of payments. It could be considered as the gesture of reliable friend from Japan's side.

With the beginning of the 21st century, India Japan relationship saw a transformation in the bilateral ties. A vast potential of economic growth could be predicted based on the economic ties between India and Japan. India is considered as the global market for commodity and the resources, this reason why Japan's interest in India is basically increasing due to the presence of variety of reasons which includes large and growing consumer base and the human resources. An agreement named as Comprehensive Economic Partnership Agreement (CEPA) between India and Japan also came into picture in August 2011 which is the most comprehensive of all such agreements that are concluded by India and it does not only cover trade in goods but the Services too along with the Investments, the Movement of Natural Persons, the Custom Procedures, the Intellectual Property Rights, and other issues pertaining to trade. The CEPA contemplate abolition of the tariffs over 94% of the items traded between Japan and India over 10 years period. Nishikasai area in Tokyo is also known as mini-India. Their growing numbers had prompted the opening of three Indian schools in Tokyo and Yokohama. It is estimated that about 27,000 Indian people live in Japan. The Indian community lives there with harmony and it has also developed a good relations with the local governments in order to become valuable community members of Japan.

2. About Indian and Japanese Stock Market

2.1India's Stock Market: National Stock Exchange (NIFTY Index)

In India, there are basically two leading stock exchanges the National Stock Exchange of India Limited (NSE) and Bombay Stock Exchange (BSE) but for the purpose of this study only NSE has been taken as it is being considered as the real barometer with the market capitalization US $1.66 trillion having ranked 12th in the global stock market. The

National Stock Exchange (NSE), set up in 1992,being India's first demutualized electronic exchange, not only provides more modern and screen-based fully-automated trading system but also makes the trading facility easier to investors who are spread across India. NSE's flagship index is CNX Nifty which incorporates 50 stocks index, which is used by the investors extensively in and around India and world for analyzing the Indian capital markets. NSE's is having state of-the-art application with record up time of 99.99% which processes messages around 450 million daily having sub millisecond response time.

2.2 Japan's Stock Market: Tokyo Stock Exchange (NIKKEI Index)

Japan is having a big exchange group which includes multiple exchanges namely, Tokyo Stock Exchange, Osaka Exchange, Chicago Mercantile Exchange but the major stock exchange is Tokyo Stock Exchange which works as a barometer for the economy. The exchange is ranked 4^{th} in the global stock markets and it is considered to be the largest market in Asia and in the East Aisa also. There are more than 2,900 listed companies in this exchange having the combined market capitalization value more than US $4.1 trillion. The exchange was set up in May 1878, as the Tokyo Kabushiki Torihikijo. Trading started from June 1878. It was thought that since the exchange was having the lower trading capacity therefore in 1943, it was combined with 10 other leading exchanges in the major cities of Japan with a view to form a single but big Japanese Stock Exchange. Due to the event of bombing on Nagasaki, this big combined exchange had to shut down and it was later reorganized. Nikkei is benchmark index of Tokyo exchange and includes Japan's 225 Stock. It was first calculated in September 1950, and it was retroactively calculated also back to May 1949. But the exchange transaction speed was not as good as NSE of India. Later they improve the exchange transaction speed and as per the recent regard, after January 2010 index is updated after every 15 seconds in the trading sessions just to improve the trading speed. There are three sections in the Tokyo exchange for listed stocks. First is for the large companies, second for the mid-sized companies and the third section is known as Mothers (Market of high-growth and the emerging stocks) for start-up companies having high-growth. The index which tracks TSE is Nikkei 225 index composed of companies that are selected by Nihon Keizai Shimbun (the largest business newspaper of Japan). Another index is TOPIX index which is based on share prices of the first section of companies and there is another index named J30 for the large industrial companies which is also maintained by the major broadsheet newspaper of Japan.

3. Review of Literature

Haavisto and Hansson (1992) tried to fill the gap through their analysis of the potential gains from the international diversification for the different Nordic investors considering that if they invest in all the Nordic equity markets. Their period of study was from 1970 to 1988. Their study compared the historical rate of return and the volatility of the different national stock markets (Copenhagen, Helsinki, Oslo and Stockholm) measured in the local currency as well as effect of fluctuating exchange rates, return and volatility. It was assumed that investors of a particular Nordic country can always be treated as a single representative individual holding a well- diversified domestic portfolio i.e., the general index of the stock market. Their findings revealed that the exchange rate risk was negligible during the period of study for an investor having a long investment horizon. Therefore, there was no reason to pay for hedging this risk. Further they found that the derivation of the ex-post effective frontier suggested that there would have been ample scope for actually reducing risk by Nordic diversification. And finally, the ex-post optimal portfolios were extremely concentrated and included in general only Finnish and Swedish assets, which are an indication of the segmented markets. Therefore, it was concluded that an investor with long term horizon would do well just by only keeping the unhedged and diversified Nordic portfolio.

One of the most detailed and comprehensive research for the linkage of stock prices and macroeconomic factors was conducted by Muradoglu, Taskin, and Bigan (2000), where they tried to explore the possible causality between 19 emerging market returns and their interest rates, exchange rates, industrial production and inflation during the study period starting from 1976 to 1997. The findings of study found that relationship between stock returns and the macro economic variables were due to mainly the relative size of respective securities market and moreover due to their integration with world markets. Husain and Saidi (2000) tried to explore the interdependence of the equity market in Pakistan with seven major equity markets of UK,USA, France, Japan, Germany, Singapore and Hong Kong. With the help of Engle and Granger co-integration, they examined integration using weekly stock index during January 1988 to December 1993. Their analysis revealed that there is a little support for the integration of Pakistani equity market with the other international nations markets. They concluded that there exist an opportunity for diversification for international investors in Pakistan. On the other hand Chonget al. (2002) tested the relationship among the six Latin American countries which includes Argentina and Brazil too by introducing the error correction VAR technique with the use of daily index value for the period 1995 - 2000 and concluded that the diversification benefit in the different Latin American markets was limited.

Mukhopadhyay and Sarkar (2003) explored the impact of different macroeconomic factors on the returns generated by Indian stock market during pre and post liberalization period of this market. They found that before the liberalization period (198-1995), the money supply growth, inflation, real economic activity, NASDAQ-index and FDI were found to be significant in explaining the variations in the Indian stock returns but this phenomenon was found not significant after the liberalization period (since 1995). Gay (2008) tried to explore the relationship among exchange rate, oil prices (as macroeconomic variables) and stock market index prices for Brazil, Russia, India, and China (BRIC) with the application of Box-Jenkins ARIMA model during 1993 to 2006. The results confirm that there was no significant relationship among them in either of BRIC country. It may have happened due to influence of other domestic and international macroeconomic factors on the stock market returns. Also, the results show a weak form of market efficiency which in turn suggest that there was no significant relationship between the present and the past returns on stock market. Bora *et al.* (2009) investigated emerging market index of BRICA (Brazil, Russia, India, China, and Argentina) and examined linkages among stock market of BRICA countries and their relations with US market. They employed VAR techniques to model interdependencies and Granger causality test for finding the evidence of a short-run relationship among these markets. Their results showed that the US market had a significant effect on all the BRICA countries on the same trading day. The study conducted by Sheu and Liao (2011) explored among the BRIC securities markets and US market, the evolving pattern of integration and Granger causality relationships. Their empirical results showed that the stock markets of Russia, China and Brazil have started exerting significant influences on the US Dow Jones exchange to some extent after the period of 2006 and the Dow Jones index has continued to play a vital and dominant role in Granger causing shifts in the emerging markets of India, Russia and China. Their findings spoken about the time-varying nature of the non-linear co-integration and Granger causality relationships and apart from that it also indicated that the potential benefits from international risk diversification, to some extent, may have gradually diminished within these group of markets.

Vieito et al. (2013) examined about the presence of weak-form efficiency in most developed (G-20) countries of world along with the 2007 financial crisis impact on the stock markets of these countries, in the context of their efficiency. They applied serial correlation test, ADF unit root test etc. Their entire study period was divided two different segments viz; a pre-crisis period (from January 1, 2005 to August 8, 2007) and a

during crisis period (from August 9, 2007 to December 31, 2011). They found emergence of strong effects across all the international markets (except Saudi Arabia) as an aftermath of 2007 crisis. It may have happened due to the increased intra-day international activity across the different markets of world. They found inefficient market index but the individual stocks efficient. The most robust result of their analysis was that most of the individual markets were showing the weak-form efficiency. So, they concluded that during the pre-crisis, volatility was low but heteroskedastic. However, in crisis period, the volatility was seen high but it was homoscedastic which is actually appeared to be a crisis paradox. Palamalai et al. (2013) examined existence of market integration among major Asia-Pacific emerging economies' stock markets, namely Hong-Kong, India, Singapore, Malaysia, Taiwan, Japan, South Korea, Indonesia and China. They applied Johansen Co-integration which confirmed existence of long-run equilibrium relationship among them which further helps to infer that there is an existence of common force like arbitrage activity that is responsible for bringing these markets together in the long term. The Granger causality/Block exogeneity results and Wald test based on VECM revealed stock market interdependencies and the dynamic interactions among the selected emerging Asia-Pacific economies. Finally it was concluded that the investors can have a feasible benefits in the short run from the international portfolio diversification. The study further says that although benefits of long-term diversification are limited but the short-run benefits prevail due to substantial transitory fluctuations. Although study conducted by Bhanumurthy and Singh (2014) evaluated the short-run IPOs' performance but they also revealed that the performance of the IPOs also affect the return of stock index (though in short-run). So, the stock index returns of different markets are also influenced by the IPOs introduced in their respective economy. Paramati et al. (2015) tried to examine the manner and extent of interdependencies in stock market between Australia and its trading partners and the effect of trade intensity. They believed that markets with greater (lower) trade intensity will be having more (less) interdependent with Australia. With the application of correlation (unconditional and conditional) analyses between Australia and its trading partners they found that most of the markets which are having the higher degree of correlation with Australia are the major trading partners. Further with the application of panel regression, they investigated the impact of trade intensity on correlation of stock market between Australia and trading partners of Australia. They found that trade intensity affect significantly and positively correlations of Australia with its major partners.

Tripathi & Kumar (2014) studied the long term relationship between the inflation and stock returns in BRICS markets with the help of panel data for the period from March 2000 to September 2013. They used ADF, PP and KPSS unit root tests for stationarity

and found non-stationary in the characteristic of the data. They examined long term integrating relationship with the help of Pedroni panel co-integration, between inflation rate and stock index values andfound no existence of no co-integrating relationship in long term. The correlation results revealed about significant negative relationship between inflation rate and the stock index for Russia and a significant positive relationship for India & China. They concluded that the Changes in the inflation may bring some sort of short run movement in the stock returns but it is certain that the equity does not seem to be good hedge against inflation in emerging BRICS markets at least for the long run. Karamchandani et al. (2014) examined dynamics of BRIC economies' major stock indices. They tried to investigate existence of predictability in these markets coupled with new volatility measure hint towards the non-linear dynamics. They found Indian market to be least volatile amongst BRIC economies. Their study provide a wide implications ranging from market efficiency interpretations, to facilitating investors on deciding on their exit and entry into the market and also for the regulators on when to intervene.

4. Objectives of Study

The paper speaks about the inter-linkages and relationship between Indian and Japanese securities exchange markets. The specific objectives of the study are as under:

Primary Objective:

1. To analyze inter-linkages and relationship between Indian and Japanese securities exchange markets.

Secondary Objective:

1. To test financial co-integrating between India and Japan.

2. To examine the existence of correlation between Japanese and Indian exchange markets.

5. Research Design and Methodology

5.1 Data

This article is an attempt to explore the inter-linkages and relationship between Indian (National Stock Exchange) and Japanese (Tokyo Stock Exchange) securities exchange markets and tried to find new range of relationship with the help of testing financial

integration between these markets. The study has been conducted considering the time period starting from January 1, 2000 to December 31, 2016 for evaluating existence of inter-linkages and relationship. We have taken one stock exchange from both the countries. Tokyo Stock Exchange (TSE) from Japan as the representative exchange has been taken and Nikkei index price has been used. Since India has two leading stock exchanges National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) therefore, we opted only NSE (CNX Nifty Index) as the representative exchange of India.

The weekly closing stock index price has been used during 2000 to 2016to testify existence of inter-linkages between NSE and TSE. The data mainly gathered from *TSE website, NSE website, Yahoo finance*, *Moneycontrol.com, Investing.com* and websites of the various agencies of respective government and annual reports. Secondary data and other pertinent literature available on this subject had been compiled from published/unpublished materials, documents and internet sources through extensive desk work. The data analysis was done with E-Views 9.

5.2 Tools and techniques

The Descriptive Statistics (mean, median, mode, standard deviation, skeweness, kurtosis) used to summarise the general trend and pattern of the dataset. For checking data series stationarity, which is essential for enhancing reliability and accuracy of the model, we prepared the line graph of each series. Time series data is called stationary if the mean, variance and auto-covariance are independent of time. We have used the log value of indices and further testified the nature of data series with the application of Augmented Dickey-Fuller (ADF) test under unit root hypothesis testing with below mentioned equation.

$$\Delta y_t=\alpha+\beta_t+\gamma y_{t-1}+\delta_1\Delta y_{t-1}+\cdots+\delta_{p-1}\Delta y_{t-p+1}+\varepsilon_t$$

Where α is referred as constant, βtime trend coefficient and p being lag order of autoregressive process. Imposing constraints α=0 and β=0 corresponds random walk modeling and use of constraint β=0 corresponds modeling the random walk with drift.

After ADF test, we applied Johansen Co-integration in indices of TSE and NSE and estimated the correlation value and after finding it test of Granger causality was conducted on NSE and TSE index return for capturing the degree and the direction of causation between India and Japan's stock price indices under study and to further explore long and short run integration and interrelationships between these stock markets.

6. Data Analysis and Interpretation

The data is statistically evaluated and interpreted in this section for indices of TSE and NSE. Starting with descriptive statistics as shown in Table 1, the results obtained for the same depicts that Nikkei and Nifty index is negatively skewed which means tail of distribution is on left or distribution is having a long left tail and concentration of mass distribution is on right. The kurtosis, in normal distribution series, has a value of 3. Since the kurtosis value of NSE and TSE coming out to be less than 3, it infers that these return series are mesokurtic. The mean value of NSE (Nifty) return is 8.121182 whereas the mean value of TSE is 2.090534which mean Japanese market produces little bit lesser return than Indian market.

Table 1: Descriptive Statistics

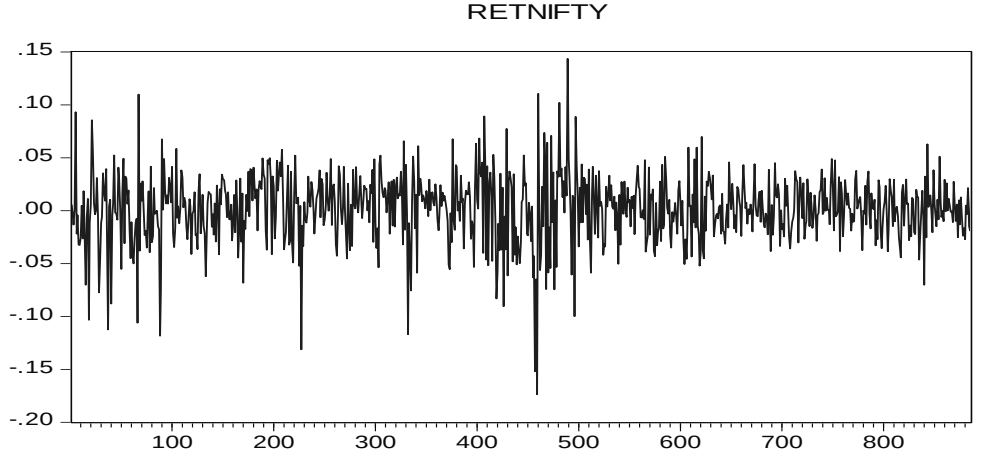
Descriptive Statistics		
	NSE	NIKKEI
Mean	8.121182	2.090534
Median	8.383776	2.126298
Maximum	9.098039	2.208059
Minimum	6.750165	1.909567
Std. Dev.	0.709792	0.089566
Skewness	-0.443466	-0.520250
Kurtosis	1.777810	1.837356
Jarque-Bera	84.27973	89.97062
Probability	0.000000	0.000000
Observations	887	887

Source: Authors' own calculation

To capture the econometric results and its interpretation two series representing the stock indices of Japan and India were statistically analysed in E-Views 9. Since it is essential to assure series under study is stationary, in econometric analysis, we have used the log value of indices. The series was tested and found non-stationery at level but stationary at first difference. The line graphs are prepared for stationarity. Graph 1 and 2 demonstrate the line graph of Indian and Japanese stock indices returns at first difference. Since it is always good to testify and reconfirm the results with other available tools for having We

applied Ganger causality test between them, found probability value of hypothesis RETTSE more reliability in the data series, we applied ADF test on the indices of TSE and NSE for unit root.

Graph 1: Line graph of NSE Nifty Return



Graph 2: Line graph of TSE Nikkei return

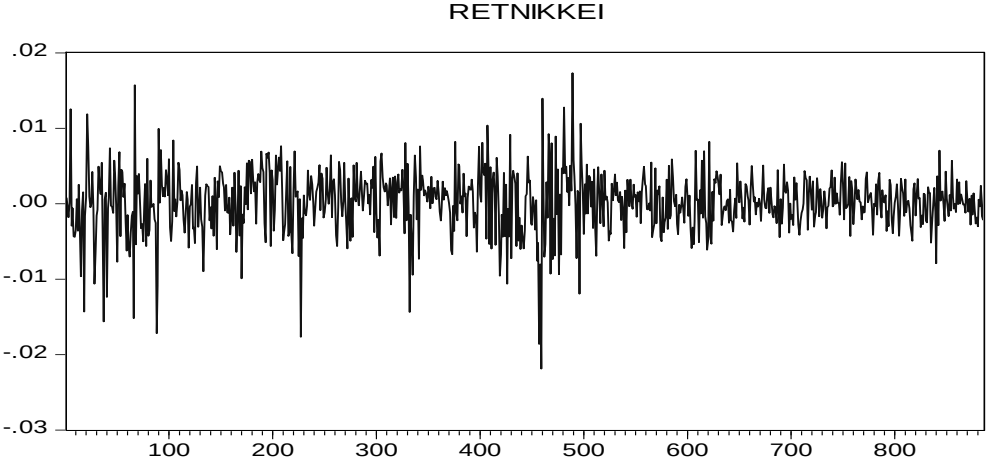


Table 2 and Table 3 represent result of unit root with Augmented Dickey-Fuller. We tested the null hypothesis, data series has unit root, at 1%, 5% and 10% significance level

and we found that since the p-value was more than 0.05 therefore it was coming out to be non-stationary but we tested the series again with first difference and we found the data series stationary as the p-value was lesser than 0.05 with. Moreover, the t-statistics was also found more than critical values so we rejected the null i.e., data has unit root at first difference, hence it made the data fit for further econometric testing.

Table 2: ADF results for NSE Index

Null Hypothesis: D(LOGNSE) has a unit root Exogenous: Constant Lag Length: 1 (Automatic - based on SIC, maxlag=20)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-18.68798	0.0000
Test critical values:	1% Level		-3.437524	
	5% Level		-2.864596	
	10% Level		-2.568451	
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGIND(-1)	-0.863067	0.046183	-18.68798	0.0000
D(LOGIND(-1))	-0.088309	0.033578	-2.629960	0.0087
C	0.001583	0.001069	1.480776	0.1390
R-squared	0.477268	Mean dependent var		2.95E-05
Adjusted E-squared	0.476081	S.D. dependent var		0.043771
S.E. of regression	0.031683	Akaike info criterion		-4.062707
Sum squared resid	0.884339	Schwarz criterion		-4.046470
Log likelihood	1798.717	Hannan-Quinn criter.		-4.056499
F-statistic	402.1873	Durbin-Watson stat		1.995525
Prob(F-statistic)	0.000000			

Source: Authors' own calculation

Table 3: ADF results for TSE Nikkei

Null Hypothesis: D(LOGTSE) has a unit root Exogenous: Constant Lag Length: 1 (Automatic - based on SIC, maxlag=20)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-18.70782	0.0000
Test critical values:	1% Level		-3.437524	
	5% Level		-2.864596	
	10% Level		-2.568451	
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGASX(-1)	-0.862338	0.046095	-18.70782	0.0000
D(LOGASX(-1))	-0.085153	0.033583	-2.535621	0.0114
C	0.000193	0.000135	1.428595	0.1535
R-squared	0.475006	Mean dependent var		3.31E-06
Adjusted E-squared	0.473814	S.D. dependent var		0.005535
S.E. of regression	0.004015	Akaike info criterion		-8.194186
Sum squared resid	0.014202	Schwarz criterion		-8.177949
Log likelihood	3624.830	Hannan-Quinn criter.		-8.187978
F-statistic	398.5572	Durbin-Watson stat		1.996319
Prob(F-statistic)	0.000000			

Source: Authors' own calculation

We applied Ganger causality test between them, found probability value of hypothesis RETTSE does not Granger Cause RETNSE less than 0.05 telling the rejecting the null and infers that TSE does affect return on NSE and RETNSE does not Granger Cause RETNSE also found to be less than 0.05 which infers NSE also affect TSE.

Table 4: Granger causality test results

Null Hypothesis	F-Statistics	Prob.	Causal Relationship
RETNSE does not Granger Cause RETTSE	1.67555	0.0492	YES
RETTSE does not Granger Cause RETNSE	1.31696	0.0410	YES

Source: Authors' own calculation

We applied Johansen Co-integration test, after Granger causality, for evaluating the financial co-integration between NSE and TSE. It is clear from the Unrestricted Co-integration Rank Test (Trace) results that since trace statistic is more than critical value and p-value is less than 0.05 therefore we should reject the null hypothesis, i.e., there is no co-integration between the stock market of Japan and India. Basically trace test indicates about presence of two co-integrating equations at significance level 0.05. Unrestricted Co-integration Rank Test (Maximum Eigenvalue) is also telling the same, i.e, there is a presence of two co-integrating equations at the level of significance 0.05. It was also expected from the test of co-integration as we know that India and Japan share a very long rooted history of relationship in spiritual affinity and strong civilizational and cultural. We believe that this friendship between India and Japan is not only bringing two economies closer to each other in the economic and political perspective but also in the financial perspective too which is evident from the co-integration test too.

Table 5: Co-integration results of NSE (Nifty) and TSE (Nikkei)

Trend assumption: Linear deterministic trend
Series: LOGNSE LOGTSE
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None	0.170027	318.5930	15.49471	0.0001
At most 1	0.160764	154.4075	3.841466	0.0000

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None	0.170027	164.1855	14.26460	0.0001
At most 1	0.160764	154.4075	3.841466	0.0000

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LOGNSE	LOGTSE
-655.2252	4848.623
-466.4622	4073.921

Source: Authors' own calculation

7. Conclusion

Tokyo Securities Exchange (TSE) and National Stock Exchange (NSE) are two fully automated exchanges of world and both are the major stock market of Asian economy. TSE is ranked 4th in the world according to market capitalization and India (NSE) is also

ranked 12th in the gobal stock exchnages. Although, India and Japan are not close neighboring countries but still they are the major players of Asia and have a good trade, economic and political relationship from years. This paper tried to investigate the existence of financial integration and linkages between NSE and TSE with stock index co-movement and with the use of various econometric tests.

We applied ADF test for checking usability of data series for econometric test and found data series non-stationary at level but stationary at first difference. Descriptive statistics showed that stock market of India provide higher returns in compare of Tokyo Securities Exchange market. Correlation between the indices is coming out to be +0.804784 which depicts stock market of India is correlated with Japanese Market.

Testing results of Granger Causality explained that return at TSE Granger Causes return at Indian exchange which infers that the returns on NSE is influenced by the Nikkei index co-movements and vice-versa. Johansen Co-integration also speaks about existence of co-integration between them. Therefore, our concluding remark is that India and Japan has good relations, both countries enjoy a strategic position in their own geographical cluster. Both being major players of Asia. India and Japan also having long historical relationship in the context of spiritual affinity and the civilizational and cultural ties too. In 1991, Japan also proved as a reliable friend by participating in the process of bailing out India from crisis of balance of payment and that too unconditionally. The Nishikasai area in Tokyo is emerging as a "mini-India".

Keeping in view all the historically and modern ties between these two countries we could interpret that stock market of NSE and TSE is found to be financially integrated with each other. Granger causality also speaks about causal relationship of TSE and NSE. It might be possible that data taken for the analysis may be not too long to tell everything but still we believe that these two nations have been together and it is the result of togetherness between them that now they are having the relationship and inter-linkages with each other. Not only that, even it has been noticed that if one significant event takes place in one country then it is surely going to impact the other country too, not fully but at least to some extent.

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