STOCK MARKET MOVEMENTS AND LINKAGES BETWEEN EMERGING MARKETS IN ASIA AND DEVELOPED MARKET INDICES: SHORT RUN AND LONG RUN ANALYSIS

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Abstract
This research paper investigates the stock market movements and linkages between the Asian emerging markets (China, India, Indonesia, Korea, Malaysia, Philippines, Taiwan and Thailand) and two developed markets (i.e. USA and Japan). This study employs the statistical application of descriptive statistics, unit root test, correlation and pairwise granger causality test. The study used daily data from 01st January, 2005 to 31st December, 2014, to examine both short-run (year wise) and long-run (whole study period) movements and linkages between Asian emerging stock markets and two developed stock markets. The presence of short-run relationship and absence of a strong long-run relationship, among these markets, were found. The short run (year wise) and long run movements and linkages have important implications for investors, risk managers and regulators. It is found that Indian stock market experienced less movements with developed markets (USA and Japan). This study also suggested that India’s stock market is largely protected from global events i.e., 2007-2008. The sample stock markets of these eight countries of Asian emerging markets provide attractive diversification opportunities, for international portfolio investors during the long run period. All the eight countries of Asian emerging markets provide attractive diversification opportunities for international portfolio investors, over a long period.

Keywords: Stock Market Movements and Linkages; Asian Emerging Markets; Developed Markets; Short Run and Long Run; Correlation Matrix and Pairwise Granger Causality Test.

JEL Classification: B26; C12; C22; C58; G11; G15

INTRODUCTION
Capital Market plays an important role in the economy of a country because among many functions, it serves two main functions. First, Capital Market serves as an alternative for a company’s capital resources. The capital gained from the public offering, could be used for the company’s business development, expansion, and so on. Second, it serves as an alternative for public investment. The people could invest their hard earned money, according to their preferred returns and risk characteristics of each instrument (Napitupulu, T.A and Wijaya, Y. B., 2013). Capital Market is the market system in which long term financial instruments, such as bonds, equities, mutual funds and derivative instruments, are traded. It serves as an alternative for a company’s capital resources and public investment which could be used for infrastructures needed for the development of the firms in the long run. Over the past few decades, the infrastructure development has been playing an increasingly important role in promoting sustainable economic development. The development of capital markets has also been recognized as important for sustaining the economic development (Masahiro Kawai and Andrew Sheng, 2012).

The emerging capital markets, evolved significantly over the last three decades and they have adopted constant innovation, to improve liquidity and market microstructure. Similar to developed markets, the system of emerging capital market also facilitates the allocation of available fund, the raising of capital and the risk sharing, both at national and international levels, through their linkages to world capital markets (Mohamed El Hedi Arouri et al., 2010). The concept of “Emerging Markets”, used in the beginning of the 1980s, was initially developed to designate financial markets located in developing countries. The term “Emerging Markets” was coined by World Bank economists, Antoine W. Van Agtmael (1981) and it refers to nations undergoing rapid economic growth and industrialization. The term is often used interchangeably with "emerging and developing economies and describe it as economies with low to middle per capita income (Economy Watch, 2010). According to the modern portfolio theory, the evaluation of the co-movement is of striking importance for international investors who are engaged in a continuous search for benefits arising from a well-diversified global portfolio. The co-movement and linkages of stock returns are not stable over time. Longin, F and Solnik, B., 1995 emphasized the importance of examining co-movement dynamics. The co-movement is the tendency of two variables, e.g. the returns from two investments to move in parallel. It could be measured by using correlation co efficient. The degree of
international co-movements in stock price indices, has changed significantly since the crash of UK, German and French stock markets, being related with the U.S. market, only after the crisis (Arshanapalli, B and Doukas, J., 1993). International diversification strategy brings more profits while insuring a reduction in risk (Kasilingam Lingaraja et al., 2015)

REVIEW OF LITERATURE OF THE STUDY
An attempt has been made to review the earlier research works undertaken in the area of stock market movement and linkages of emerging stock markets with developed markets, to test the investment opportunities, portfolio diversification and hedging results, and also to understand research gaps, tools used and findings of earlier studies

Harvey Arbelaez et al. (2001) examined the short-term and long-term linkages among the several stock indices of the Medellin Stock Exchange, Colombia, through causality and cointegration methodologies. It was observed that the short-term and long-term linkages, among the sample indices, became stronger over time. It was found that the national markets of USA, Europe, and Asia, were more integrated with each other during the study period. Gong-meng Chen et al. (2002) studied the behavior of stock prices in six major Latin American stock exchanges using univariate and multivariate approaches. The sample stock exchanges included Brazil, Mexico, Chile, Argentina, Colombia and Venezuela markets. It was found that investing in various Latin American stock markets, offered limited risk diversification, until 1999. Manuel Illueca and Juan Angel Laffuente (2002) provided additional insights into the issue from a data set of main international stock markets. It is suggested that risk-averse investors, who sought portfolio diversification, must take into account a large number of countries. Orawan Ratanapakorn and Subhash C. Sharma (2002) investigated the short-term and long-term relationships in five regional stock indices (USA – S&P 500 Index, European Index, Asian-Pacific index, Latin American index and Eastern European-Middle East index) during the pre-Asian crisis (January 1, 1990 to December 31, 1996) and Asian crisis (July 2, 1997 to March 10, 2000) periods. Statistical tools like Unit Root Test (ADF and PP), Co-integration, Granger Causality and assets Error Correction Model (VECM) were used. It was found that the US stock market was the most influential one among regional markets during the study period. Eiji Fuji (2005) analyzed the causal linkages among several emerging stock markets (Hong Kong, Malaysia, Philippines and Thailand) in Asia and Latin America (Argentina, Brazil and Chile), using the daily observations. It was found that there were indeed considerable causal interactions across the emerging stock markets. In other words, within each region as well as across the two regions, the stock markets appeared to become more interdependent with each other. Sazali Zainal Abidin (2006) studied the relationship (by correlation coefficient) between Malaysia and other sample countries, during different sub-periods, broken by pre, during and post-crisis or stock market crash. The MSCI country indices and domestic-based stocks moved together during crisis periods and the least during non-crisis periods. Ming-Shiou Pan et al. (2007) demonstrated the dynamic linkages between the foreign exchange and stock markets of seven East Asian countries (Hong Kong, Japan, Korea, Malaysia, Singapore, Taiwan, and Thailand). The findings indicated that the linkages could vary across economies, with respect to exchange rate regimes, the trade size, the degree of capital control, and the size of equity market. Abbas Valadkhani and Surachai Chancharat (2008) investigated the long-run and short-run relationships between the Thai stock market and its major trading partner countries (Australia, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan, the UK and the US). It was found from the results that there was bidirectional Granger causality between the stock returns in Thailand and three of its neighboring countries (i.e. Malaysia, Singapore and Taiwan). Panayiotis F. Diamandis (2009) examined the dynamic behaviour of stock market volatility, among four sample Latin American stock markets (i.e., Argentina, Brazil, Chile and Mexico). The mature stock market of US had got changed during the last two decades. Zeynel Abidin Ozdemira et al. (2009) studied the dynamic linkages between the equity markets of a center (US) and its periphery emerging markets (Argentina, Brazil, Chile, China, Indonesia, Malaysia, Mexico, Peru, Philippines, Singapore, South Korea, Taiwan, Thailand, Turkey and Venezuela). This study found significant causal relation between S&P 500 and all emerging stock markets, by using Unit Root Test, Multivariate Co Integration Test and Pair wise Granger-Causality Test. Ashwin G. Modi et al. (2010) explored the co-movement pattern of risk and return (long run) among the eight stock markets, using Principal Components Analysis, during the study period. It was observed that the eight stock markets were fragmented into two major components – American Region (DIIA, NASDAQ, MXX and BVSP) and emerging markets (BSE, HANGSENG and RTS). According to Rakesh Gupta and Francesco Guidi (2012), there was linkage between stock market of India and three developed markets through integration methodologies and correlation. It was observed that there was a short-run relationship and absence of a strong long-run relationship among these markets and it was suggested that the presence of short-run linkages among these markets may provide potential benefits for the investors that look at emerging markets, to enhance their risk adjusted returns by including emerging markets in their portfolios. Cristiana Tudor and Carmen Popescu – Dutaa (2012) investigated the issue of Granger causality between stock prices and exchange rates movement for developed (Australia, Canada, France, Hong Kong, Japan, United Kingdom, and United States) and emerging financial markets (Brazil, China, India, Korea, Russia and South Africa). Kasilingam Lingaraja et al. (2014) studied the indices of eight Asian emerging markets and one developed market, namely, Singapore. The inter linkages and co-movements of markets were tested, by using 12 year period time series data. It was pointed out that the retail investors may use this information for making efficient investment decisions while investing in the indices of emerging stock markets in Asia. Kasilingam Lingaraja et al. (2014a) investigated the efficiency of stock market and volatility behavior of eight Asian emerging market indices. This paper provided significant evidences, for market efficiency and randomness distribution, in these emerging Asian markets. Kasilingam Lingaraja et al. (2014b) investigated the inter linkages and co-movements among Asian emerging stock market indices in general and CNX Nifty index of India in particular. It was found that the four emerging Asian markets (China, Malaysia, Philippines, and Thailand) did not record inter linkages and co-movements with India during the study period. According to Kasilingam Lingaraja et al. (2015), there was correlation among the returns of six select Asian stock market indices of India, China, Japan, Hong Kong, Singapore, and Taiwan, over a longer time period. It was found that the correlation between the markets, provided useful information, to the foreign institutional investors, portfolio managers, regulators, and policy makers. In this study, there were good opportunities for overseas portfolio diversification and the investors may earn high return. Kasilingam Lingaraja et al. (2015) investigated the dynamic linkages between emerging Asian stock market indices and developed stock market index over the period. It was found that...
the emerging stock market indices of Asia, namely, S&P CNX Nifty (India), FTSE Bursa (Malaysia) and Philippine Stock Index (Philippines), recorded dynamic linkages with Dow Jones Industrial Average (USA) and the other five Asian emerging market indices (i.e., SSE Composite Index (China), Jakarta Composite Index (Indonesia), Korea Stock Exchange Index (Korea), TSE Weighted Index (Taiwan) and SET Index (Thailand)) did not develop dynamic linkages with USA (DJIA), a developed country.

The above literature provides an overview of some empirical studies already undertaken on the same lines of the present research. It is found that only few studies focused on the stock market movements and linkages of emerging stock markets of Asia with developed markets. Besides, the review of earlier studies clearly reveals the fact that there was no comprehensive study, exclusively covering the stock market movements and linkages of emerging stock market indices in Asia with developed markets, both short and long run. Therefore, the present study is an attempt to investigate the stock market movements and linkages for sample indices of eight emerging Asian stock markets, with two developed markets and it may partially fill this research gap.

RESEARCH METHODS
Statement of the Problem
Some of the emerging stock markets in regions like America and Europe, have been extensively researched in the past. But markets like Asia and Africa, have not attracted much academic attention. It is important to note that Asian Region has been considered significant by the international investors, for international portfolio diversification, as the diversification strategy provides effective risk minimization and return maximization. The fluctuations in the Asian emerging markets were attributed heavily to cross border capital flows in the form of FIIs [Debjan Mukherjee, 2007]. It is significant to note that the emerging stock markets in Asia, have been experiencing significant growth and achieved high performance but with low correlation with the developed markets. This fact prompted the academic researchers to analyze and find out the reasons behind this fact. The study, on the co-movements (using daily return) between the emerging markets in Asia and developed markets, found correlations to be low and there was less market movements [Udai Lal Paliwa, 2013 and Bodie, et al, 2008]. The diversification and overseas portfolio investment decisions are based on several factors. Sound knowledge about stock market performance, movements and linkages between emerging stock markets and developed markets, is essential while developing overseas portfolio diversification strategy and making smart investment decision [Ibrahim, M.H and A.H. Baharom, 2011]. There is no secret code, to help the international investors, to identify different portfolios, pertaining to emerging markets like Asian stock markets. Intensive research on portfolio diversification opportunities in emerging markets, is needed to understand the volatility of emerging stock markets and the risk-return opportunity, both short and long run period. Against this background, an attempt has been made in this study, to examine stock market movements and linkages between emerging markets in Asia and developed market indices.

Need and Importance of the Study
The present study examines the stock market movements and linkages, among the indices of selected emerging stock markets in Asia, with two benchmark indices from developed stock markets. It is useful for international portfolio managers, in taking asset allocation decision. In other words, movements and linkages of Asian emerging stock markets with developed markets, provide vital information to international equity investors, both in terms of managing the risk and maximizing the returns. This study would help the investors to identify the best Asian markets for their investment and decide on a good diversification strategy. The study of this nature could reduce the time of domestic as well as Foreign Institutional Investors (FIIs) for taking better diversification strategy.

Scope of the Study
This study provides a detailed analysis of stock market movements and linkages of emerging equity stock markets in Asia with developed markets. As pointed out earlier, the research studies, covering potential benefits and opportunities in emerging Asian markets in recent times, are limited. Hence this research study tries to fill up this gap in research. An attempt has been made in this study, to find the portfolio diversification opportunities, in Asian emerging markets. Besides, this study tests the normality and stationarity for data adequacy, using descriptive statistics and unit roots. Further, the present study would identify co-movements and dynamic linkages between Asian emerging markets indices and developed markets, using correlation and pairwise granger causality.

Objectives of the Study
The following are the objectives of this research study.

1. To analyse the normality and stationarity of sample emerging Asian markets and developed markets indices, during short and long run periods.
2. To examine the co-movements and dynamic linkages between sample indices of emerging stock market in Asia with selected developed markets, during short and long run periods.

Null Hypotheses of the Study
The following null hypotheses were developed and tested in the study.

NH01: There is no normality among the indices of emerging Asian stock markets and developed markets during short and long run periods.
NH02: There is no stationary among the sample indices of emerging Asian stock markets and developed markets during short and long run periods.
NH03: There is no co-movements between indices of emerging Asian stock markets and developed markets during short and long run periods, and
NH04: There is no bidirectional/ unidirectional linkages between the indices of emerging Asian stock markets with the developed stock markets during short and long run periods.

Methodology of the Study
Sample Selection
In order to examine the stock market linkages and movements between the sample indices of emerging stock markets in Asia and developed markets, the study focused on eight Asian emerging equity markets and two benchmark indices, as identified by the Morgan Stanley Capital International (MSCI). For the purpose of this study, all the eight Asian emerging market indices and two top developed markets were selected on the basis of market capitalization. A total of eight emerging market indices and two indices from developed markets, were selected as the sample. MSCI methodology has been widely used by previous research studies.

Selection of Sample Indices
For the purpose of examining the stock market movements and linkages between sample indices of emerging stock markets in Asia and two benchmark indices from developed stock markets, as pointed out earlier, it was decided to select one index from each sample market. Accordingly, the sample indices (emerging markets in Asia), used in the study, were Shanghai Stock Exchange Composite Index (China), NSE Nifty (India), Jakarta
Composite Index (Indonesia), Kospi Index (Korea), KLCI (Malaysia), Philippine stock Index (Philippines), TSEC weighted Index (Taiwan) and SET Index (Thailand), while indices of the developed markets were Dow Jones Industrial Averages – DJIA (USA) and Nikkei 225 (Japan). The details about the names of sample indices, names of sample stock markets, study period and observations used, are given in Table - 1.

Table - 1: The Details of Sample Asian Emerging and Developed Countries and Sample Stock Market Indices

| Sample Asian Emerging Stock Markets | S.No | Country | Name of the Stock Exchange | Name of the Index | Study Period | No of Obs |
|------------------------------------|------|---------|---------------------------|-------------------|-------------|----------|
| 1                                  | China| Shanghai Stock Exchange | SSE Composite Index | 1st Jan, 2005 to 31st Dec, 2014 | 2508        |
| 2                                  | India| National Stock Exchange | S&P CNX Nifty Index | 1st Jan, 2005 to 31st Dec, 2014 | 2483        |
| 3                                  | Indonesia| Indonesia Stock Exchange | Jakarta Composite Index | 1st Jan, 2005 to 31st Dec, 2014 | 2439        |
| 4                                  | Korea| Korea Stock Exchange | Korea Stock Exchange Index (KOSPI) | 1st Jan, 2005 to 31st Dec, 2014 | 2477        |
| 5                                  | Malaysia| Malaysia Stock Exchange | FTSE Bursa Malaysia Kuala Lumpur Composite Index (KLCI) | 1st Jan, 2005 to 31st Dec, 2014 | 2470        |
| 6                                  | Philippines| The Philippine Stock Exchange | Philippine Stock Index (PSI) | 1st Jan, 2005 to 31st Dec, 2014 | 2441        |
| 7                                  | Taiwan| Taiwan Stock Exchange | Taiwan Stock Exchange (TSEC Weighted Index) | 1st Jan, 2005 to 31st Dec, 2014 | 2468        |
| 8                                  | Thailand| Stock Exchange of Thailand | Stock Exchange of Thailand Index (SET Index) | 1st Jan, 2005 to 31st Dec, 2014 | 2443        |

Source: Morgan Stanley Capital International (MSCI) http://www.msci.com retrieved on 15.01.2015

Source of Data
The study used daily adjusted closing prices of each of the sample indices, collected from MSCI Emerging Market Database, Bloomberg database, World Federation of Exchanges (WFE), Yahoo Finance database, available online at www.finance.yahoo.com, Global stock market database online at www.quandl.com, KtStock Feeder (Global Markets Database), Equity Index Data from EconStats database available at www.econstats.com and website of National Stock Exchange (NSE). The other required data were also collected from various books, journals and research databases. Finally, the daily index return were transformed by taking natural logarithm of the raw index return data. The returns, used in each of the time series, were computed as follows:

\[ \log \frac{P_t}{P_{t-1}} \]

Where: \( r_t \) : the day return, \( P_t \) : the value of the index, \( P_{t-1} \): the value of the index the previous working day

Period of the Study
The study covered a period of ten years, from January 1, 2005 to December 31, 2014.

Tools used for Analysis
For the purpose of analysis of this study, statistical tools such as descriptive statistics, ADF and PP test, person correlation test, pairwise granger causality and graphs, were used.

Limitations of the study
The study suffers from the following limitations.

\[ \begin{align*}
& \quad \text{This study considered only eight indices of Asia from emerging market and two indices from developed markets (as identified by MSCI).} \\
& \quad \text{Only four tests (descriptive statistics, unit root test, correlation and pairwise granger causality) were used in this study. There are still many other relevant tests that could have been used to identify the co-movements and linkages of stock markets.} \\
& \quad \text{There are many other elements that may influence the market fluctuation but this study used only one index of the respective country.} \\
& \quad \text{This research work was limited to a ten year period from 01st January, 2005 to 31st December, 2014.} \\
& \quad \text{As the study was based on secondary data, it is beset with certain limitations which are bound to arise dealing exclusively with secondary data.} \\
& \quad \text{All the limitations, associated with the statistical tools used, are applicable to this study also.} \\
\end{align*} \]

RESULTS AND DISCUSSION
Normality for Asian Emerging Stock Markets and Developed Markets
In order to test the normality, for eight Asian emerging stock market and two Developed Markets (both at long run and short run), the descriptive statistics was used. The results of descriptive statistics (Mean, Standard Deviation, Skewness, Kurtosis, Jarque-Bera and Probability) values, for the sample stock market indices (emerging Asian stock markets and developed markets), during short run (year wise) and long run (whole period), are given in Table - 2. It is noted from the analysis of short run (year wise) that the highest mean average returns for sample indices like India (Nifty Index) and Japan (Nikkei 225 Index), were recorded at 0.00123 and 0.00141 respectively, in 2005. Similarly, two indices, namely, Indonesia (Jakarta Composite Index) and Philippines (PSI) in 2006 earned values of 0.00153 and 0.00155 respectively, while China (SS Composite Index) and India (Nifty Index) earned values of 0.02984 and 0.01168 respectively, in 2007. In the year 2008, all the sample indices recorded negative mean return due to the Global Financial Crisis. Further, in 2009, two countries, namely, India (Nifty Index) and Indonesia (Jakarta Composite Index)
Table - 2: Results of Descriptive Statistics among the Sample Indices during Short and Long Run Period

| Sample Markets | Emerging Sample Stock Markets in Asia | Developed Markets |
|----------------|---------------------------------------|-------------------|
|                | China | India | Indonesia | Korea | Malaysia | Philippines | Taiwan | Thailand | USA | Japan |
| **2005**       |       |       |           |       |          |             |        |          |     |       |
| Mean           | 0.00123 | 0.00068 | 0.0018 | -0.00001 | 0.00058 | 0.00029 | 0.00021 | 0.00002 | 0.00141 |
| Std. Dev.      | 0.01329 | 0.01108 | 0.01049 | 0.00488 | 0.0112 | 0.00813 | 0.00879 | 0.00648 | 0.00855 |
| Skewness       | 1.19646 | -0.47351 | -0.40406 | -0.21474 | 0.26489 | -0.2651 | -0.0587 | -0.12635 | 0.00822 | -0.21129 |
| Kurtosis       | 8.7632 | 3.52961 | 5.50973 | 3.35466 | 4.05474 | 3.62655 | 3.76815 | 4.16299 | 3.03783 | 4.66145 |
| Jarque-Bera    | 421.855 | 12.31301 | 70.38664 | 5.21714 | 14.33771 | 6.90515 | 6.21445 | 14.45911 | 0.01787 | 30.00223 |
| Probability    | 0 | 0.0021 | 0.0472 | 0.0008 | 0.0317 | 0.0447 | 0.0007 | 0.9911 | 0 |
| **2006**       |       |       |           |       |          |             |        |          |     |       |
| Mean           | 0.00186 | 0.0002 | 0.00058 | 0.00015 | 0.00083 | -0.0001 | 0.00057 | 0.00029 | 0.00014 |
| Std. Dev.      | 0.01304 | 0.01645 | 0.01148 | 0.00522 | 0.01248 | 0.01026 | 0.01556 | 0.00617 | 0.01249 |
| Skewness       | -0.2637 | -0.5105 | -0.4115 | -0.47978 | 0.10491 | -0.7095 | -2.0832 | -0.0837 | -0.1017 |
| Kurtosis       | 5.71214 | 5.56663 | 7.99247 | 3.68872 | 5.11063 | 5.06268 | 5.32069 | 45.8188 | 4.24895 | 3.40213 |
| Jarque-Bera    | 82.7012 | 79.4784 | 286.4781 | 11.8513 | 55.3227 | 41.8786 | 76.1523 | 187.395 | 16.6067 | 2.09803 |
| Probability    | 0 | 0 | 0.0027 | 0 | 0 | 0 | 0 | 0 | 0.002 |
| **2007**       |       |       |           |       |          |             |        |          |     |       |
| Mean           | 0.00298 | 0.00184 | 0.00172 | 0.00124 | 0.00109 | 0.00094 | 0.00038 | 0.00116 | 0.00005 | 0.00004 |
| Std. Dev.      | 0.02215 | 0.01601 | 0.01449 | 0.01035 | 0.0168 | 0.01329 | 0.01122 | 0.00989 | 0.01162 |
| Skewness       | -0.9374 | -0.1672 | -0.42282 | -0.5901 | -0.73112 | -0.0271 | -0.6932 | -0.06779 | -1.2692 | -0.4463 |
| Kurtosis       | 4.67533 | 4.4852 | 7.12962 | 6.19896 | 6.52301 | 9.26556 | 5.40838 | 4.0847 | 8.57658 | 4.88348 |
| Jarque-Bera    | 63.7433 | 24.0459 | 185.092 | 119.167 | 150.954 | 400.78 | 78.1914 | 121.486 | 394.192 | 44.3469 |
| Probability    | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0023 | 0 |
| **2008**       |       |       |           |       |          |             |        |          |     |       |
| Mean           | -0.0038 | -0.0026 | -0.00259 | -0.0017 | -0.0019 | -0.0025 | -0.0022 | -0.0023 | -0.0013 | -0.0016 |
| Std. Dev.      | 0.02827 | 0.02792 | 0.02461 | 0.02455 | 0.01358 | 0.02093 | 0.02129 | 0.021 | 0.02384 | 0.02907 |
| Skewness       | 0.40563 | -0.1364 | -0.27043 | -0.0781 | -1.19355 | -0.8238 | 0.08801 | -0.5861 | 0.42522 | 0.01217 |
| Kurtosis       | 4.14636 | 4.33608 | 6.18577 | 7.45403 | 11.7347 | 8.35387 | 3.55528 | 7.8509 | 7.15106 | 7.02919 |
| Jarque-Bera    | 20.6267 | 19.0598 | 105.2864 | 204.421 | 843.851 | 321.626 | 3.50628 | 254.743 | 189.271 | 165.732 |
| Probability    | 0 | 0.001 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1732 | 0 |
| **2009**       |       |       |           |       |          |             |        |          |     |       |
| Mean           | 0.00232 | 0.00245 | 0.00245 | 0.00161 | 0.00151 | 0.0019 | 0.00236 | 0.00188 | 0.00068 | 0.00079 |
| Std. Dev.      | 0.01836 | 0.02182 | 0.0151 | 0.01543 | 0.01403 | 0.01316 | 0.01531 | 0.01535 | 0.01516 | 0.01752 |
| Skewness       | -0.5498 | 1.93627 | 0.19529 | -0.3126 | 0.93057 | 0.02816 | -0.1312 | -0.4116 | 0.16595 | 0.01908 |
| Kurtosis       | 4.44158 | 19.0768 | 3.52455 | 4.80206 | 58.8661 | 3.82229 | 5.34052 | 3.48255 | 5.36179 | 3.53782 |
| Jarque-Bera    | 35.475 | 276.788 | 4.33056 | 38.2024 | 32546.7 | 6.79325 | 57.3176 | 9.22025 | 59.7262 | 2.94345 |
| Probability    | 0 | 0 | 0.1147 | 0 | 0.0353 | 0 | 0.01 | 0 | 0.2295 |

Continued...
| Year       | Mean  | Std. Dev. | Skewness | Kurtosis | Jarque-Bera | Probability |
|------------|-------|-----------|----------|----------|-------------|-------------|
| 2010       | -0.0005 | 0.001372 | -0.5778 | 4.75288 | 47.5673 | 0.0435 | 0 | 0.0009 | 0 | 0.0077 | 0 | 0 | 0.5529 |
| 2011       | -0.0009 | 0.01142 | -0.2399 | 3.60677 | 6.23212 | 0.1346 | 0 | 0 | 0.0002 | 0 | 0 | 0 | 0 | 0 |
| 2012       | -0.0002 | 0.01094 | 0.31101 | 3.66074 | 49.9161 | 0.0948 | 0 | 0 | 0.0038 | 0 | 0.0004 | 0.0708 | 0.1066 | 0.086 | 0.7971 |
| 2013       | -0.0015 | 0.01159 | -0.3036 | 5.19935 | 51.6245 | 0.0002 | 0 | 0 | 0 | 0.0006 | 0 | 0 | 0.1888 | 0.0001 | 0.003 | 0 |
| 2014       | 0.000171 | 0.0103 | -0.1642 | 7.34186 | 188.016 | 0.1994 | 0 | 0.528 | 0 | 0.0001 | 0 | 0.0001 | 0 |

| Year       | Mean  | Std. Dev. | Skewness | Kurtosis | Jarque-Bera | Probability |
|------------|-------|-----------|----------|----------|-------------|-------------|
| 2005-2014  | 0.00051 | 0.01644 | -0.1889 | 6.84707 | 1561.51 | 0.001 | 0 | 0.002 | 0 | 0.001 | 0 | 0 | 0 |

Electronic copy available at: https://ssrn.com/abstract=3612495
The results of mean return (%) based on trading days among the sample indices during short and long run period, are shown in Table – 3. The mean returns of all the sample indices, earned during short and long run period, ranged from -96.13 percent to 190.97 percent. But the average daily mean return of Indonesia (Jakarta Composite Index) was higher than that of other sample stock markets, with 190.97 percent, for 249 trading observations, for long run (2005-2014), followed by India (Nifty) with 167.11 percent, for 248 trading days and Philippines (PSE) with 158.67 percent, for 244 trading days. At the same time, during the short run (year wise) period, the SSE composite index of China received 85.83 percent, for 260 trading days in 2005, and 72.21 percent, for 249 trading days in 2005. It is inferred that China (SSSE Composite Index) recorded the least mean return value of -96.13 percent, for 251 observations in 2008.

Table - 4 shows the results of descriptive statistics and hypothetical test - based probability value (P-Value), among the sample indices, during short and long run period. All the sample indices of Asian emerging markets and developed markets, except USA (DIA) in 2005, Japan (Nikkei 225 Index) in 2006, Taiwan (TWII) in 2008, Indonesia (Jakarta Composite Index) and Japan (Nikkei 225) in 2009, India (Nifty Index) and Japan (Nikkei 225 Index) in 2010, China (SSE Composite Index) and India (Nifty Index) in 2011, India and Taiwan in 2012 & 2013, India and Korea in 2014, were distributed normally. At the same time, all sample indices were normally distributed at 99% confident level, based on probability (P-Value) in the long run (2005-14) period. In other words, all the sample indices were moderately volatile, both short and long run period. It is found from the overall result of the Tables - 2, 3 & 4 that all the sample indices were less volatile and the distribution of return data, for all the sample indices, was normal. Hence the null hypothesis (NH01) - there is no normality among sample Indices of Emerging Asian Stock Markets and developed markets during the short run and long run periods, was rejected.

### Table - 3: Results of Mean Return (%) based on Trading Days among the Sample Indices during Short and Long Run Period

| Year | Emerging Stock Markets in Asia | Developed Markets |
|------|--------------------------------|-------------------|
|      | China | India | Indonesi a | Korea | Malaysia | Philippines | Taiwan | Thailand | USA | Japan |
| 2005 | -6.42% | 30.90% | 16.55% | **44.80%** | -0.16% | 14.19% | 7.21% | 5.12% | 0.42% | 34.47% |
|      | (260) | (251) | (243) | (249) | (247) | (246) | (247) | (245) | (252) | (245) |
| 2006 | **85.83%** | 36.95% | 45.38% | 4.82% | 20.87% | 37.40% | 20.43% | **-3.50%** | 14.36% | 7.07% |
|      | (260) | (250) | (244) | (247) | (247) | (247) | (247) | (243) | (251) | (248) |
| 2007 | **72.21%** | 45.87% | 43.00% | 30.50% | 27.09% | 23.05% | 9.28% | 28.18% | 1.24% | **-10.88%** |
|      | (242) | (249) | (250) | (246) | (249) | (245) | (243) | (244) | (252) | (245) |
| 2008 | -96.13% | **-63.35%** | **-62.61%** | **-42.46%** | **-46.98%** | **-60.29%** | **-53.82%** | **-57.21%** | **-32.46%** | **-40.18%** |
|      | (251) | (246) | (242) | (247) | (247) | (246) | (248) | (247) | (253) | (245) |
| 2009 | **59.96%** | 59.58% | 59.54% | 40.45% | 37.75% | 45.67% | 58.50% | 45.71% | **17.24%** | 19.10% |
|      | (259) | (243) | (243) | (252) | (250) | (240) | (248) | (243) | (252) | (243) |
| 2010 | -11.97% | 17.24% | 38.29% | 20.12% | 24.18% | 34.95% | 10.25% | 35.94% | **10.27%** | -1.96% |
|      | (259) | (252) | (245) | (249) | (248) | (241) | (250) | (242) | (248) | (245) |
| 2011 | -22.80% | **-26.48%** | 5.19% | **-9.15%** | 0.46% | 5.26% | **-22.07%** | 0.80% | 6.78% | **-17.98%** |
|      | (250) | (247) | (247) | (246) | (245) | (246) | (246) | (244) | (253) | (245) |
| 2012 | 5.93% | 25.33% | 12.13% | 10.09% | 11.20% | 28.94% | 11.39% | 30.31% | 6.22% | 20.71% |
|      | (243) | (251) | (244) | (248) | (245) | (244) | (247) | (245) | (251) | (248) |
| 2013 | -5.74% | 7.38% | 0.59% | **-0.25%** | 11.26% | 3.09% | 10.83% | **-5.93%** | **21.67%** | **45.68%** |
|      | (238) | (250) | (238) | (247) | (247) | (243) | (245) | (245) | (252) | (248) |
| 2014 | **40.67%** | 28.13% | 19.77% | **-2.18%** | **-4.78%** | 19.63% | 8.35% | 20.31% | 8.67% | 11.24% |
|      | (238) | (244) | (242) | (246) | (245) | (243) | (247) | (245) | (252) | (252) |

| Year | Emerging Stock Markets in Asia (2005-2014) | Developed Markets (2005-2014) |
|------|------------------------------------------|-------------------------------|
|      | 127.66% | 176.11% | 100.97% | 99.33% | 81.76% | **158.67%** | **60.71%** | 100.65% | 70.95% | 71.95% |
|      | (2508) | (2483) | (2439) | (2477) | (2470) | (2441) | (2468) | (2443) | (2516) | (2464) |

Source: The results of Table – 2

Source: http://finance.yahoo.com/, Bloomberg Database and Computed using E-Views (Version - 7).
Note: Mean Return (%) = Mean Value X Total Number of Observations

Table - 4: Results of Descriptive Statistics among the Sample Indices during Short and Long Run Period

| Year   | Emerging Stock Markets in Asia | Developed Markets | Hypothesis (NH01) |
|--------|--------------------------------|------------------|-------------------|
|        | China | India | Indonesia | Korea | Malaysia | Philippines | Taiwan | Thailand | USA | Japan |            |
| 2005   | S     | S     | S         | S     | S        | S           | S       | S        | NS  | S     | Rejected   |
| 2006   | S     | S     | S         | S     | S        | S           | S       | S        | S   | NS    | Rejected   |
| 2007   | S     | S     | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2008   | S     | S     | S         | S     | S        | NS          | S       | S        | S   | S     | Rejected   |
| 2009   | S     | S     | NS        | S     | S        | S           | S       | S        | S   | NS    | Rejected   |
| 2010   | S     | S     | NS        | S     | S        | S           | S       | S        | NS  | S     | Rejected   |
| 2011   | NS    | NS    | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2012   | S     | NS    | S         | S     | S        | S           | NS      | S        | S   | NS    | Rejected   |
| 2013   | S     | S     | S         | S     | S        | NS          | S       | S        | S   | S     | Rejected   |
| 2014   | S     | NS    | S         | NS    | S        | S           | S       | S        | S   | S     | Rejected   |
| 2005-2014 (Whole Period) | S | S | S | S | S | S | S | S | S | S | Rejected |

Source: The results of Table - 2.

Note: ‘S’ indicates levels of significance at 1% and 5% and ‘NS’ indicates not significant.

Table - 5: Results of ADF and PP Test among the Sample Indices during Short and Long Run Periods

| Year   | Emerging Stock Markets in Asia | Developed Markets | Hypothesis (NH02) |
|--------|--------------------------------|------------------|-------------------|
|        | China | India | Indonesia | Korea | Malaysia | Philippines | Taiwan | Thailand | USA | Japan |            |
| 2005   | S     | S     | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2006   | S     | S     | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2007   | S     | S     | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2008   | S     | S     | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2009   | S     | S     | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2010   | S     | S     | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2011   | S     | S     | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2012   | S     | S     | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2013   | S     | S     | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2014   | S     | S     | S         | S     | S        | S           | S       | S        | S   | S     | Rejected   |
| 2005-2014 (Whole Period) | S | S | S | S | S | S | S | S | S | S | Rejected |

Source: http://finance.yahoo.com/, Bloomberg Database and Computed using E-Views (Version - 7).

Note: ‘S’ indicates levels of significance at 1%, 5% and 10%.
Stationarity for Asian Emerging Stock Markets and Developed Markets

The Unit Root Test (ADF and Phillips-Perron Test), for sample indices of both Asian emerging stock markets and developed stock markets, was used to measure the stationarity of the return series. A Unit Root Test examines whether a time series data (daily closing value) attained stationarity or non-stationarity, both during short and long run periods. The results of ADF and PP test, for sample indices (return series) of eight Asian Emerging Stock Markets and two Developed Stock Markets, during long run and short run periods, are presented in Table 5. It is evident from the results of the above Table (Augmented Dickey Fuller - ADF Test and Phillips Person - PP Test) that the values of test critical, for all sample indices of emerging markets in Asia, were analyzed at three significant levels of 1%, 5% and 10%. The probability values, for all the eight sample Asian emerging market indices and two developed market indices, were zero. It is clear from the analysis of ADF and PP Test that the statistical value was less than the critical value, for all the ten sample indices, both during short run (year wise) and long run (whole year) period. Besides, the analysis of ADF and PP Test shows that the returns of all sample indices, during short run and long run periods (year wise) and long run (2005-14) period, attained stationarity at 1%, 5% and 10% significance levels. Hence, the null hypothesis (NH02), namely, **there is no stationarity among the sample Indices of Emerging Asian Stock Markets and developed markets during the short run and long run periods**, was rejected.

**Co-Movements between Asian Emerging Stock Markets and Developed Markets**

One of the factors that contributes to the portfolio risk is the co-movements among individual stock indices returns. An attempt has been made to study the co-movements of eight Asian emerging stock markets, with two developed stock markets indices (Dow Jones Industrial Averages – DJIA (USA) and Nikkei 225 (Japan)). The positive and high correlation indicate low scope for portfolio diversification benefits while negative and low correlation indicate high scope for portfolio opportunity and also high scope for diversification benefits. The correlation matrix analysis was used to study the relationship (co-movements) between Asian emerging stock markets and developed markets. The analysis of correlation matrix was used in this study, to study co-movements, between sample indices of Asian emerging markets and developed markets.

### Table 6: Results of Correlation between Asian Emerging Markets and Developed Market (DJIA- USA) during Short and Long Run Period

| Year | Sample Emerging Markets | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2005-2014 (Whole Period) |
|------|-------------------------|------|------|------|------|------|------|------|------|------|------|-------------------------|
| China | -0.048 | -0.049 | 0.017 | 0.032 | -0.119 | 0.101 | 0.115 | 0.057 | 0.118 | -0.011 | -0.028 |
| India | 0.118 | 0.09 | 0.081 | -0.119 | 0.087 | 0.115 | -0.029 | 0.071 | 0.084 | 0.075 | 0.030 |
| Indonesia | 0.034 | 0.185** | 0.017 | 0.108 | 0.182** | 0.254** | -0.089 | 0.087 | 0.008 | -0.013 | -0.014 |
| Korea | 0.072 | 0.206** | 0.240** | -0.007 | 0.228** | 0.276** | 0.014 | 0.317** | 0.193** | -0.019 | -0.041* |
| Malaysia | 0.032 | 0.115 | 0.118 | -0.057 | 0.058 | -0.017 | -0.029 | 0.075 | 0.017 | -0.087 | -0.018 |
| Philippines | 0.091 | 0.008 | 0.052 | -0.026 | 0.069 | 0.033 | 0.056 | 0.112 | 0.196** | 0.033 | -0.262 |
| Taiwan | 0.083 | 0.011 | -0.054 | -0.119 | 0.028 | -0.022 | -0.002 | -0.137* | 0.033 | 0.131* | 0.0073 |
| Thailand | 0.071 | 0.078 | -0.028 | -0.025 | 0.171** | -0.083 | -0.032 | 0.003 | -0.023 | 0.018 | 0.001 |

**Hypothesis (NH03)**

Accepted | Partially Accepted | Accepted | Accepted | Partially Accepted | Accepted | Partially Accepted | Accepted | Partially Accepted | Accepted | Accepted | Accepted |

*Note: **Correlation is significant at the 0.01 level (2-tailed) and *Correlation is significant at the 0.05 level (2-tailed).*

The results of correlation, between emerging Asian stock markets and developed market (DJIA - USA), during long run (whole year) and short run (year wise), are presented in Table-6. The sample developed stock market index (DJIA) of USA was significantly correlated with Kospi Index of Korea in 2006, 2007, 2009, 2010, 2012 and 2013, with correlation coefficient values of 0.206, 0.240, 0.228, 0.276, 0.317 and 0.193 respectively, at 95% confident level, followed by Jakarta Composite Index of Indonesia, with values of 0.185, 0.182 and 0.254, in 2006, 2009 and 2010 respectively. At the same time, TSEC Weighted Index (Taiwan), with correlation coefficient values of -0.137 and 0.131, in 2012 and 2014 respectively. Further, Philippines Stock Price Index (Philippines) and SET Index (Thailand) were significantly correlated with values of 0.196 and 0.171 in 2013 and 2009 respectively. The remaining three markets, namely, China, India and Malaysia were not significantly correlated with DJIA (USA), both at short run and long run period.

**Table – 7** shows the results of correlation, between emerging Asian markets and developed market (Nikkei 225 Index – Japan), during long run (whole year) and short run (year wise) periods. It is clear that the sample Asian emerging stock market indices, namely, SSE Composite Index of China, Jakarta Composite Index of Indonesia, PSI index (Philippines) and TSEC Weighted Index (Taiwan), significantly moved (correlated) with developed market of Nikkei 225 Index (Japan), with values of 0.068, 0.097, -0.042 and 0.054 respectively, during long run (whole sample) period. In the short run (year wise) period, Jakarta Composite Index of Indonesia significantly moved in 2006, 2007, 2009 and 2012, with correlation coefficient values of 0.204, -0.149, 0.163 and 0.248 respectively. At the same time, Kospi Index of Korea significantly correlated in 2008, 2011, 2012 and 2014, with values of 0.320, 0.247, 0.280 and -0.131 respectively. Further, the other six sample Asian emerging market namely, China, India, Malaysia, Philippines, Taiwan and Thailand did not move fully with the developed market of Nikkei 225 Index, during short run periods. The analysis of correlation, between Asian emerging markets and developed markets (USA and Japan), during short run period (year wise) and long run (2005-14) period, did not confirm correlation.
Table – 7: Results of Correlation between Asian Emerging Markets and Developed Market (Nikkei 225 Index- Japan) during Short and Long Run Period

| Year | Sample Emerging Markets | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2005-2014 (Whole Period) |
|------|-------------------------|------|------|------|------|------|------|------|------|------|------|--------------------------|
| China | -0.009 | -0.108 | -0.143* | -0.001 | -0.087 | -0.119 | 0.033 | -0.015 | 0.135* | 0.016 | 0.068** |
| India | -0.003 | 0.202** | 0.071 | 0.059 | 0.134* | 0.012 | -0.052 | -0.088 | -0.072 | -0.075 | -0.022 |
| Indonesia | 0.115 | 0.204** | -0.149* | 0.085 | 0.163* | 0.011 | 0.031 | 0.248** | 0.007 | -0.025 | 0.097** |
| Korea | 0.099 | 0.084 | 0.117 | 0.320** | 0.001 | 0.008 | 0.247** | 0.280** | -0.025 | -0.131* | -0.024 |
| Malaysia | 0.084 | 0.113 | 0.172** | -0.136* | 0.062 | -0.012 | 0.107 | -0.021 | -0.004 | 0.051 | 0.027 |
| Philippines | 0.104 | -0.074 | -0.012 | -0.199** | 0.046 | 0.191** | -0.066 | 0.029 | -0.023 | -0.016 | -0.042* |
| Taiwan | -0.004 | 0.045 | -0.007 | 0.165** | 0.016 | 0.045 | 0.007 | -0.057 | -0.095 | -0.062 | 0.054** |
| Thailand | 0.082 | 0.061 | 0.245** | -0.095 | 0.005 | -0.009 | -0.064 | 0.053 | 0.119 | -0.187** | -0.002 |

Hence the null hypothesis (NH03), namely, there is no co-movements between selected indices of emerging stock market in Asia with selected developed markets during short and long run periods, was partially accepted. As pointed out earlier, the level of portfolio diversification benefits depends upon the level of correlation between emerging and developed stock market indices i.e., low correlation indicates a high potential for diversification benefits through reduction in investment risk and vice versa.

Bidirectional/ Unidirectional Dynamic Linkages for Asian Emerging Stock Markets with Developed Markets
The Pairwise Granger Causality Test was used, to study the stock market linkages among the eight Asian emerging stock markets indices with two developed markets indices, during short and long run periods. There are three forms of dynamic linkages for sample indices such as unidirectional (“→”) or “←”), or one way linkage, bidirectional (“↔”) or two way linkage and no causality linkage (“---”). The level of significance (linkage) was tested at two levels (i.e., 1% and 5%), using Granger Causality (Granger, 1969). As per the norms of Granger Causality Test, the value of F-Statistics i.e., higher than 3.01, indicates 5% level of significance while a value greater than 4.63, indicates 1% level of significance.

The results of Pairwise Granger Causality Test, revealing the three forms of dynamic linkages (bidirectional, unidirectional and no causality), between sample indices of eight sample emerging stock markets and DJIA Index (USA), during short and long run periods, are exhibited in Table - 8. It is evident from the above Table that among the sample indices of eight Asian emerging markets, only three sample indices, namely, India (Nifty Index) for 2007 and 2010, Korea (KOSPI) in 2012 and 2014, Philippines (PSI) for 2013, registered bidirectional (↔) or two way causality linkage with the developed market of DJIA (USA). At the same time, no sample Asian emerging market index registered bidirectional (↔) or two way causality linkage, with the developed market of DJIA (USA), in the long run (2005-14). Further, the five sample emerging markets in Asia, namely, India (Nifty Index), Indonesia (Jakarta Composite Index), Korea (KOSPI), Malaysia (KLCI) and Philippines (PSI) recorded unidirectional (“→”) or one way linkage, with the developed market of DJIA (USA), during short run periods. At the same time, the remaining three sample Asian emerging markets i.e., China (SS Composite Index), Taiwan (TWII) and Thailand (SET Index) registered large number of no causality linkage (“---”), with the developed market index of DJIA (USA), during short run periods.

Table – 8: Results of Pairwise Granger Causality Testing the Dynamic Linkages of Eight Emerging Asian Markets with Developed - DJIA Index (USA) during Short and Long Run Period

| Year | Asian Emerging Markets | China | India | Indonesia | Korea | Malaysia | Philippines | Taiwan | Thailand | Hypothesis (NH04) |
|------|------------------------|------|------|----------|-------|----------|-------------|--------|----------|------------------|
| 2005 | ---                    | →    | ---   | ---      | ---   | ---      | ---         | ---    | ---      | Partially Rejected |
| 2006 | ---                    | ←    | ←    | ←       | ←     | ←       | ←           | →      | ←        | Rejected          |
| 2007 | ---                    | ←    | ←    | ←       | ←     | ←       | ←           | →      | ←        | Rejected          |
| 2008 | ---                    | ←    | ←    | ←       | ←     | ←       | ←           | →      | ←        | Partially Rejected |
| 2009 | ←                      | ←    | ←    | ←       | ←     | ←       | ←           | →      | ←        | Rejected          |
| 2010 | ---                    | ←    | ←    | ←       | ←     | ←       | ←           | →      | ←        | Partially Accepted |
| 2011 | ---                    | ←    | ←    | ←       | ←     | ←       | ←           | →      | ←        | Partially Rejected |

Note: **. Correlation is significant at the 0.01 level (2-tailed) and *. Correlation is significant at the 0.05 level (2-tailed).

Source: http://finance.yahoo.com/, Bloomberg Database and Computed using E-Views (Version - 7).

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Table – 9: Results of Pairwise Granger Causality Testing the Dynamic Linkages of Eight Emerging Asian Markets with Developed – Nikkei 225 Index (Japan) during Short and Long Run Periods

| Year          | China | India | Indonesia | Korea | Malaysia | Philippines | Taiwan | Thailand | Hypothesis (NH04) |
|---------------|-------|-------|-----------|-------|----------|-------------|--------|----------|------------------|
| 2005          | ↔     | ↔     | ↔         | ↔     | ↔        | ↔           | ↔      | ↔        | Partially Rejected |
| 2006          | ←     | ←     | ↔         | ↔     | ←        | ←           | →      | <->      | Rejected          |
| 2007          | ↔     | ↔     | ←         | ←     | ↔        | ←           | →      | ←        | Partially Rejected |
| 2008          | ↔     | ↔     | ←         | ↔     | ↔        | →           | →      | ↔        | Rejected          |
| 2009          | ↔     | ↔     | ←         | ←     | ↔        | ←           | →      | ↔        | Partially Rejected |
| 2010          | ↔     | ↔     | ←         | ←     | ↔        | ←           | →      | ↔        | Partially Rejected |
| 2011          | ↔     | ↔     | ←         | ←     | ↔        | ←           | →      | ↔        | Partially Rejected |
| 2012          | ↔     | ↔     | ←         | ←     | ↔        | ←           | →      | ↔        | Partially Rejected |
| 2013          | ↔     | ↔     | ←         | ←     | ↔        | ←           | →      | ↔        | Partially Rejected |
| 2014          | ↔     | ↔     | ←         | ←     | ↔        | ←           | →      | ↔        | Partially Rejected |
| 2005-2014 (Whole Period) | ↔   | ↔   | ↔         | ↔     | ↔        | ↔           | ↔      | ↔        | Accepted          |

Source: http://finance.yahoo.com/, Bloomberg Database and Computed using E-Views (Version - 7)

Note: “→” and “←” indicates unidirectional causality
“↔” indicates bidirectional causality and
“--” indicates no causality.

Table 9 examines the results of Pairwise Granger Causality Test, revealing the three forms of dynamic linkages (bidirectional, unidirectional and no causality), between sample indices of eight Asian emerging stock markets and Nikkei 225 Index (Japan), during short and long run period. It is seen from the short run analysis, as given at the above Table that out of eight sample indices of Asian emerging market, five sample indices, namely, S&P CNX Nifty index (India) in 2005, Jakarta Composite index (Indonesia) in 2008, KOSPI (Korea) in 2008, KLCI (Malaysia) in 2012, and SET Index (Thailand), in 2008, 2009 and 2012 experienced bidirectional (↔) or two way causality linkage, with the developed market index of Nikkei 225 (Japan), in short run period. Besides, the long run (2005-14) analysis shows that only three indices, namely, Jakarta Composite Index (Indonesia), PSI (Philippines) and TSEC Weighted index (Taiwan) recorded bidirectional (↔) or two way causality linkage, with the developed market index of Nikkei 225 (Japan), in the long run (2005-2014) period. However, the seven sample indices (Viz., S&P CNX Nifty – India, Jakarta Composite Index – Indonesia, KOSPI – Korea, KLCI – Malaysia, PSI – Philippines, TSEC Weighted Index – Taiwan and SET Index - Thailand), revealed unidirectional (→ and ←) or one way linkage, with the developed market index of Nikkei 225 (Japan), both short and long run periods. But the sample index of china revealed large number of no causality linkage (→→) with the developed market index of Nikkei 225 (Japan) both during short and long run period. It is interesting to note that, all the eight sample emerging markets showed no causality linkage (→→), with the developed market index of Nikkei 225 (Japan), in 2014. Hence the null hypothesis (NH04) - there is no bidirectional/ unidirectional linkages between the indices of emerging Asian stock markets.
stock markets with the developed stock markets both short and long run periods, was partially rejected.

Graphical Expression for Indices of Emerging Stock Markets in Asia and Developed Markets
The results of Price Fluctuation (Closing Value and Return Value), among the Sample Indices of Asian emerging markets and developed markets, during the study period from 01st January, 2005 to 31st December, 2014, are exhibited individually in Figure -1. It is interesting to discover from the above figure that the lines of all the ten sample indices, had declined during 2007 – 2008, due to the subprime crisis of USA (2007 – 2008).

Figure – 1: Results of Price Fluctuation (Closing Value and Return Value) among the Sample Indices during the study period from 01st January, 2005 to 31st December, 2014.

Source: http://finance.yahoo.com/, Bloomberg Database and Computed using E-Views (Version - 7)

According to this study, the movements of all the sample indices were affected by the subprime crisis of USA equally, both at emerging markets and developed markets. However, it is clearly observed that visible (major) downfall was noticed for the period 2007 – 2008, in the movement of indices of (SSE Composite Index – China, KOSPI Index – Korea, KLCI – Malaysia, TSEI Weighted Index – Taiwan and Nikkei 225 – Japan) while minor downfall was noticed, in the case of indices like S&P CNX Nifty – India, Jakarta Composite Index – Indonesia, Philippine Stock Index – Philippines, SET Index – Thailand and DJIA – USA. In short, all the eight Asian emerging market indices performed equally (moved upward) from 2009 to 2014.

CONCLUSION
The purpose of this research paper was to examine the short-run and long-run movements and linkages among the Asian emerging markets and two developed markets. The data correspond to daily price for the eight indexes of the Asian emerging markets in general and two developed markets in particular, for the time period January 1, 2005 to December 31, 2014. The tools like descriptive statistics, unit root test, correlation and pair wise granger causality tests, were used to test the normality, stationarity, movements and linkages respectively, for both short-term and long-term periods. Diversification opportunities are available for emerging stock markets in Asia in the long-run. At the same time, the domestic investors can still achieve normal profits through portfolio diversification in the short-run. In addition, there are portfolio diversification opportunities for international investors, to obtain long-run profits, in Asian emerging markets. It is found that the two emerging markets in Asian region, namely, Jakarta Composite Index (Indonesia) and S&P CNX Nifty Index (India), recorded maximum return (mean) and minimum risk (Standard Deviation). The global investors may note this information about these two emerging markets (Jakarta composite index – Indonesia and S&P CNX Nifty Index – India) of Asian region for investment purpose, in the long run time horizon.

Besides, the diversification of risk could be achieved, only through market investment in uncorrelated or less correlated markets with developed markets. Hence the global investors could consider the three Asian emerging stock market indices, namely, S&P CNX Nifty Index (India), KLCI Index (Malaysia) and SET Index (Thailand), which are suitable for framing optimum portfolio and to enjoy diversification benefits and opportunities in the long run. At the same time, the SSE Composite index (China) was found to experience higher standard deviation (risk) than that of other emerging markets, during the study period. High degree of risk is not generally good for retail investors but the speculators may play their game to their advantage. Hence it is suggested that the Shanghai Stock Exchange (China) is suitable for investment by the speculators. The findings of the present study, relating to international portfolio diversification, confirmed the results of Abidin, S.Z. et al, 2004. The results of
this study, particularly those of the econometric tests, have provided important information for the retail investors, governments, portfolio managers and policy regulators, in respect of the above sample countries. It is found that Indian stock market experienced less movements with developed markets (US and JAPAN). This study also suggested that India’s stock market is largely protected from global events i.e., 2007-2008. This important characteristic of our stock markets, may be attractive for international investors. Further, stock markets of these eight countries of Asian emerging markets provide attractive diversification opportunities for international portfolio investors, over a long period. Lastly, this study found that all the markets provided short run gains and long run gains. Hence there was high degree of international portfolio diversification opportunities and benefits, to invest in Asian emerging stock markets, during the long run period.

REFERENCES
1. Abbas Valadkhani and Surachai Chancharat (2008). Dynamic Linkages between Thai and International Stock Markets. Journal of Economic Studies, 35 (5), 425 – 441. http://dx.doi.org/10.1108/01443580810903572
2. Abidin, S.Z, Ariff, M., Nassir, A. and Shamsber, M. (2004). International Portfolio Diversification: A Malaysian Perspective. Investment Management and Financial Innovations, 3, 51-68.
3. Antoine W. van Agtmael (1981). The Emerging Markets Century: How a New Breed of World-Class Companies is Overtaking the World. International Finance cooperation: World Bank, Simon & Schuster Ltd (ISBN: 978-1847370303).
4. Arshanasapilli, B. and Doukas, J. (1993). International Stock Market Linkages: Evidence from the Pre- and Post-October 1987 Period. Journal of Banking and Finance, 17, 193-208. http://dx.doi.org/10.1016/0378-4266(93)90088-U
5. Ashwin G. Mod, Patel, B.K and Patel, N.R. (2010). The Study on Co-Movement of Selected Stock Markets. International Research Journal of Finance and Economics, 47, 170-185.
6. Bodie, Z., Kane, A., & Marcus, A. J. (2008). Essentials of Investments Singapore. McGraw Hill International Edition, Singapore (ISBN: 978-0778-6167-1).
7. Cristiana Tudor and Carmen Popescu – Dutaa (2012). On the relation between Stock Returns and Exchange Rates Changes for 13 Developed and Emerging Markets. Procedia – Social and Behavioral Sciences, 57, 275 – 282. http://dx.doi.org/10.1016/j.sbspro.2012.09.186
8. Debjnan Mukherjee (2007). Comparative Analysis of Indian Stock Market with International Market, Great Lakes Herald, by Great Lakes Institute of Management.
9. Eiji Fujii (2005). Intra and Inter-Regional Causal Linkages of Emerging Stock Markets: Evidence from Asia and Latin America in and out of crises. International Financial Markets, Institutions and Money, 15, 315–342. http://dx.doi.org/10.1016/j.ifm.2004.07.001
10. Gong-meng Chen, Michael Firth and Oliver Meng Rui (2002). Stock Market Linkages: Evidence from Latin America. Journal of Banking & Finance, 26, 1113-1141. http://dx.doi.org/10.1016/S0378-4266(01)00160-1
11. Granger, C.W.J. (1969). Investigating Causal Relationship by Econometric Models and Cross Spectral Models. Econometrica, 37, 424-430. http://dx.doi.org/10.2307/1912791
12. Harvey Arbelaez, W. This study also suggested that India’s Short-Term and Long-Term linkages among the Colombian Capital Market Indexes. International Review of Financial Analysis, 10, 237-273. http://dx.doi.org/10.1016/S1057-5219(01)00051-5.
13. Ibrahim, M.H and A.H. Baharom (2011). The Role of Gold in Financial Investment: A Malaysian Perspective. Journal of Economic Computation and Economic Cybernetics Studies and Research, 45 (4), 227-238.
14. Kasilingam Lingaraja, Murugesan Selvam and Vinayagamoorthi Vasanth (2014.). The Stock Market Efficiency of Emerging Markets: Evidence from Asian Region. Asian Social Science, 10 (19), 150-168. http://dx.doi.org/10.5539/ass.v10n19p158
15. Kasilingam Lingaraja, Murugesan Selvam and Vinayagamoorthi Vasanth (2015.). Dynamic Linkages between Emerging Stock Markets in Asia and a Developed Stock Market (DIA). Research Journal of Applied Sciences, 10(5), 203-211.
16. Kasilingam Lingaraja, Murugesan Selvam, Vinayagamoorthi Vasanth and Ramachandran Rajesh Ramlukmar (2015.). Long-run Overseas Portfolio Diversification Benefits and Opportunities of Asian Emerging Stock Markets and Developed Markets. International Journal of Economics and Financial Issues, 5(2), 324-333.
17. Kasilingam Lingaraja, Veluchamy Ramanujam, Lakshmanan Eswaran, Thangaraj Viswanathan, Chellaswamy Dhayanand (2020). Impact of Demonetisation on Stock Price Volatility of Public Sector Banks in India: Special Reference to SBI. International Journal of Management (IJM), 11 (3), 408-418
18. Lingaraja, K, Jothi Baskar Mohan, C, Selvam, M., Raja, M and Kathiravan, C (2020). Exchange Rate Volatility and Causality Effect of Sri Lanka (LKR) with Asian Emerging Countries Currency against USD, International Journal of Management (IJM), 11 (2), 191–208. http://dx.doi.org/10.1016/j.ijm.2020.02.001
19. Lingaraja, K, Selvam, M & Venkateswar, S (2015). An Empirical Examination of Returns on Select Asian Stock Market Indices. Journal of Applied Finance & Banking, 5(2), 97-101.
20. Lingaraja, K., Selvam, M and Vasanth, V (2014-). Co-Movements and Inter-Linkages among Emerging and Developed Stock Markets in Asia with Reference to Singapore Stock Exchange. International Research Journal of Finance and Economics, 122, 102-120.
21. Lingaraja, K, Selvam, M, Vasanth, V and Gayathri, M (2014). Co-Movements and Inter-Linkages of Indian Stock Market with Emerging Stock Market Indices in Asia. International Journal of Applied Business and Economic Research, 12(4), 1045-1064.
22. Lingaraja, K and Selvam M (2018). Co-Movements and Dynamic Linkages of Emerging Stock Markets: A Comparative Study of Asian Emerging Markets with Developed Markets, Bharathidasan University, Thesis.
23. Longin, F., and Solnik, B. (1995). Is the Correlation in International Equity Returns Constant: 1960–1990? Journal of International Money and Finance, 14, 3–26. http://dx.doi.org/10.1016/0261-5606(94)00001-H
24. Manuel Illueca and Juan Angel Lafuente (2002). International Stock Market Linkages: A Factor Analysis Approach. Journal of Asset Management, 3(3), 253-265. http://dx.doi.org/10.1057/palgrave.jam.2240079
25. Masahiro Kawai and Andrew Sheng (2012). Capital Market Reform in Asia: Towards Developed and Integrated Markets in Times of Change. Asian Development Bank Institute, SAGE Publications (ISBN: 978-8-13210-754-5).
26. Ming-Shiu Pan, Robert Chi-Wing Fok and Y. Angela Liu (2007). Dynamic Linkages between Exchange Rates and Stock Prices: Evidence from East Asian Markets. International Review of Economics and Finance, 16, 503–520. http://dx.doi.org/10.1016/j.iref.2005.09.003
27. Mohamed E1 Hedi Aroui, Fredj Jawadi and Duc Khuong Nguyen (2010). The Dynamics of Emerging Stock Markets: Empirical Assessments and Implications. Springer Publishing Services. (http://dx.doi.org/10.1007/978-3-7908-2389-9) (ISBN 978-3-7908-2389-9).
28. Napitupulu, T. A. and Wijaya, Y. B. (2013). Prediction of Stock Price Using Artificial Neural Network: A Case of Indonesia, Journal of Theoretical and Applied Information Technology, 54 (1), 104-109.

29. Niklas Ahlgren and Jan Antell (2010). Stock Market Linkages and Financial Contagion: A Cobreaking Analysis. The Quarterly Review of Economics and Finance, 50, 157-166. http://dx.doi.org/10.1016/j.qref.2009.12.004.

30. Orawan Ratanapakorn and Subhash C. Sharma (2002). Interrelationships among Regional Stock Indices. Review of Financial Economics, 11, 91-108. http://dx.doi.org/10.1016/S1059-0560(02)00103-X

31. Panayiotis F. Diamandis (2009). International Stock Market Linkages: Evidence from Latin America. Global Finance Journal, 20, 13–30. http://dx.doi.org/10.1016/j.gfj.2009.03.005

32. Rakesh Gupta and Francesco Guidi (2012). Cointegration Relationship and Time Varying Co-Movements among Indian and Asian Developed Stock Markets. International Review of Financial Analysis, 21, 10-22. http://dx.doi.org/10.1016/j.irfa.2011.09.001

33. Sazali Zainal Abidin (2006). Impact of Shifts in Correlation Structure on International Portfolio Diversification. Investment Management and Financial Innovations, 3 (2), 171-196.

34. Udai Lal Paliwal (2013). Diversification in a Small Market: Some Evidences from Namibia. International Journal of Economics and Finance, 5(5), 184 – 189. http://dx.doi.org/10.5539/ijef.v5n5p184

35. Zeynul Abidin Oxtemira, Hasan Olgun and Bedriye Saracoglu (2009). Dynamic Linkages between the Center and Periphery in International Stock Markets. Research in International Business and Finance, 23, 46–53. http://dx.doi.org/10.1016/j.ribaf.2008.05.001