Global Stock Futures : A Diagnostic Analysis Of A Selected Emerging And Developed Markets With Special Reference To India

Abstract

In this paper we investigate the nature of dynamic relationship that exists amongst selected futures indexes in American, European and Asian continents. A total of nine futures indexes are selected for investigation. The correlations among the future indexes on regional account are found to be strongly positive which is suggestive that the indexes are affected more on regional news rather on world news. The futures indexes are found to be non-stationary and American and Asian futures markets are not cointegrated, while European futures markets are found to be cointegrated. It implies that diversification and risk reduction is possible in American and Asian futures markets, but not likely in European futures markets on individual regional basis. However, the futures markets are cointegrated on inter-region basis, meaning thereby that long-term dynamic equilibrium relationship exists amongst the inter-region futures indexes, for instance, American and European, American and Asian, Asian and European futures markets. The results suggest risk diversification is less possible between regions, yet arbitrage opportunity may exist due to short-term deviation from the long-term equilibrium. Granger Casualty test reveals that directional relationship exists amongst various futures markets. The Vector Autoregression, shows that error correction term is significant but small and close to zero. It signifies that the long-run equilibrium is affected by short-run deviations, but such deviations are small that quickly revert to equilibrium condition. The impulse response analysis documents that emerging market in American continent, i.e., Mexico has a reflective effect on US Futures market while in Europe, the FTSE 100 Futures index has a predominating character. For the European futures, the France and UK futures indexes are dynamically deviating on short-run period as the shock is found to transmit in a powerful manner over the time horizon, while it is found to be low for S&P MIB (Italian futures index), revealing short-term deviations are less in this case. In Asian region, Kospi 200 Futures is found to response comparatively higher with respect to Nifty Futures and MSCI SGX Futures. The facts as revealed in our study are useful for the global fund managers in their effort to diversify risk, as cointegrated markets give little opportunity to minimize the risk through diversifications, while the non-cointegrated markets do. Nevertheless, since the cointegration is also useful to analyze arbitrage opportunity, the fund managers can utilize such opportunities available in the futures markets to their advantages by understanding the nature and extent of short-run deviations from equilibrium. The results are also important for the policy makers as the desired impact of introduction of regulatory or deregulatory measures could be affected due to underlying linkages, whose cumulative effect may remain hidden and which could jeopardize the policy framework. The policy makers may incorporate these linkages into their policy decisions model to make their implementation process successful.

Key words: World futures index, Cointegration, Vector autoregression, Impulse response

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Introduction

The globalization has a profound effect on financial market integration across the world financial markets, with the result that an international linkage amongst various individual local markets is observed. The evidences suggest that financial markets are increasingly integrated, and therefore, diversification may not yield the preferred result of reducing the risk to the desired extent. Accordingly a need has arisen to understand such linkages in order to make effective diversification with a view to reduce the risk. A host of researches documented transmission of volatility from one market to another and dynamic linkages of the markets. These studies are important as they bring out nature of linkages so that investment opportunities could be evaluated in respect of one another to maximize the return and minimize the risk. Although a large number of research papers are found in security index investigations, dearth of research initiative is observed in one of the most important segments of the financial markets, that is, the futures market. Future markets are most liquid derivative markets. The lack of research may be due to the fact that futures are short-term instruments and their trading horizons are at best few months. Moreover, due to high speculative nature of the futures, nearest-to-expiry futures contracts are actively traded, while longer period futures are neglected due to extreme speculative nature. The short-term characteristics of the futures have perhaps deterred researchers to investigate long-term dynamics of future markets. The empirical researches are largely based on understanding cross-sectional relationship of the future risk premium and risk factors associated with pricing dynamics. Additional factors that may have contributed are lack of diverse futures contracts of the same underlying asset and limited number of future contracts in each future segment of the market. We want to expand our study in this horizon and understanding the behaviour of dynamic relationship that exists amongst the futures markets of the world. It would accomplish the task of helping the global fund managers to have more transparent view on the futures market so that their ability to hedge against any perceived basis risk is better coordinated and effective. Additionally, futures market cointegration can be exploited to understand the behaviour of arbitrage opportunity. The cointegration pointing out long-run dynamic equilibrium could have short-run deviations, signaling arbitrage opportunity. Exploitation of such opportunities by the market players leads eventually to equilibrium in the system once again. It is important for the global fund managers to understand the underlying mechanism so that investment decisions could become more robust.

The rest of the paper is organized in the following way: Section I briefly gives a general survey of the research literature and describes the research objective of the paper while Section II describes the methodology and the nature of data. In Section III the results are explained and conclusions are drawn.

Section I

Literature Survey

Researchers usually use Vector Auto Regression (VAR) model along with variance decomposition and impulse response analysis to study the dynamic linkages among the stock markets. Statistical analysis of VAR model is well documented among others by Lutkepohl (1991), Johansen (1995), etc., and Ng & Perron (1995) for univariate model. Impulse response shock, depending on the order of the variables, is examined by Sims (1980) and generalization of impulse response is expanded by Lutkepohl & Poskitt (1996) and Lutkepohl & Saikkonen (1999 and 2000).

The studies relating to the stock market integration in early 1960s point out low inter-linkage of the capital markets. Agmon (1972) and Ripley (1973) establish some kind of inter-linkage among the capital markets of developed countries. The reasons for such low inter-linkage could be due to existence of trade barriers and also lack of information transmission, which could have hindered the linkage amongst the markets. Despite paucity of data and unavailability of advanced statistical tools, the studies do establish some kind of dynamic linkage among the stock markets. During 1980s and 1990s important breakthrough in statistics enabled investigation of the dynamic relationship in a major and fruitful way. With the availability of cointegration tests, the researchers are able to test the interdependency more accurately and conclusively. Meanwhile spate of globalization has increased and countries are lifting trade and other barriers for free flow of capital and goods. As a result the effect of economic impact in one country is felt in other countries as well. The capital markets are also affected and they are no more insulated from the economic shock elsewhere in the world. The effects of stock market crash of October 1987 and the Asian financial crisis in 1997 are widely felt in the whole world. The researchers who follow the trends find interdependency on wide range of market. Eun and Shim (1989) investigating markets of Australia, Canada, France, Hong Kong , Germany, Japan, Switzerland, UK and US during the period 1980-85 find market interdependency. Koch and Koch (1991) also find market interdependency between developed markets both in Asia, Europe and the USA. Hassan and Naka (1996) using vector error correction model on Japan, Germany, UK and US markets document short-run and long-run interdependency during the period 1984-91. Choudhry (1997) through cointegration test on Latin American countries, viz., Argentina, Brazil, Chile, Colombia, Mexico, Venezuela and also USA, find that the markets are cointegrated during the period 1989-93. Similarly, Chen, Firth and Rui (2002) find that capital markets of countries in Latin America, viz., Brazil, Mexico, Chile, Argentina, Colombia and Venezuela are cointegrated. Via cointegration test Masih and Masih (1997) document interdependency amongst Asian markets and the developed markets during the period 1992-94.

The research on futures involving various aspects, like, hedging effectiveness, dynamic interactions and causal relationship of stock index futures with spot market volatility, etc, are also subject matter of the studies. Figlewski (1984), finds that in case of US stock index futures, basis risk increases as the duration of hedging decreases. Booth et.al (1996), using data spanning between 1988 and 1991, investigated whether the US, UK and Japanese futures markets had a dynamic equilibrium volatility process. The evidences suggest that three markets had a single common factor generating volatilities among the markets. Holmes (2006), using FTSE 100 Stock Index futures data from 1984 to 1992 documented discrepancy between ex-post and ex-ante effectiveness of hedge. He finds, interalia, that hedge ratios and hedging effectiveness increase with hedge duration. Chou and Lee (2002), examined lead and lag relationship of Taiwan Stock Exchange weighted Index futures traded on MSCI Taiwan Stock Exchange and also traded in Singapore Exchange (SGX). They found that transaction cost is an important factor for trading parameter. Roope and Zurbruegg (2002) compared information efficiencies between Singapore Exchange and Taiwan Index Futures listed in both markets. The results suggest a common stochastic trend and that price discovery primarily originates from the Singapore futures market. Jones and Brooks (2005) presented reasons why individual investor interest in single stock futures in the US had not reached its potential. However, research investigation has hardly been directed towards understanding the dynamic linkage, if any, among the various regional futures markets, for instance, among the markets of Asia, Europe and American continents. The research in this respect is expected to bring out nature of short and long-run relationship, whether prevailing or not, among the various futures markets, so that the behaviour of the dynamic equilibrium or lack of it, could be found out and its mechanism understood. Understanding of the mechanism as well as understanding of the behavioural property of the futures market when compared with spot market, would give an opportunity to understand the individual financial market more completely, leading to better selection of investment strategies by the global fund managers. In addition, domestic policy makers could get proper clue from the intended study to frame their regulatory policies for the market appropriately. Accordingly, our aim is to fill up this gap in research process.

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Research Objectives

The research objective of this paper is to find out what kind for relationship exists amongst the futures markets and whether such relationship is influenced on global or regional basis, for instance, European region, Asian region and American region, etc. Since some of the research studies point out absence of long-run dynamic equilibrium of the stock markets, it is of interest to understand, whether such equilibrium exists in futures markets. With this context in view, the research questions that we seek to answer, are as follows:

1. What is the nature of dynamic relationship among the selected regional futures markets in Asia, Europe and America?
2. Whether any dysfunction in the dynamic nature can be explained by the evidences documented.
3. How shocks in economy affect the futures markets and how the shocks transmit amongst the markets and with what eventuality?

The primary aim and contribution of this study is to bring forth whether there exists any long-run dynamic equilibrium relationships amongst various futures markets and, if so, what is the nature of causative factors of such dynamic relationships. Our study on inter-linkage or independency of the markets will bring out valuable insight on the associations of the selected futures markets and will have important bearing on the international portfolio diversification and investment strategy in the global financial market. It would also bring out an important fact, whether the Indian future market is having a de-coupled relationship with other future markets.

Section II

Methodology

Initially, we compute the correlation coefficients of the log values of the selected world futures indexes and the results are given in Table - 1. We observe that the correlations amongst the futures indexes are moderate to highly positive. However, such results do not necessarily imply, true existence of such dependency as in many cases they may yield spurious results. Accordingly, further investigation is necessary to establish the inferences drawn from the correlation results.

One of the methods for exploring dynamic linkage of the time series is to use granger's causality test. The basic premise of the granger's is that future can not cause the present or the past. In our analysis we use the test to find out whether the futures index series data on various countries, precede each other or contemporaneous. The testing is done, based on the following equations[1]:

$$y_t = \sum_{i=1}^{k} \alpha_i y_{t-i} + \sum_{i=1}^{k} \beta_i x_{t-i} + u_t \quad 1$$

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1. G.S. Madala, "Introduction To Econometrics", John Willey & Sons, 3rd Edition , p-379

Where y_t and x_t are two time series and k is the lag length chosen according to the suitability. If β_i is zero, with lag length (i=1,2,….k) , x_t fails to granger cause y_t. However, the Granger causality test is applicable to the stationary series only. Testing non-stationary series with respect to another non-stationary series can generate misleading results, wholly spurious for drawing inferences. The futures index time series can be non-stationary, and stochastic in nature which does not converge to average value of the series in the long run. The stochastic trend of a non-stationary series leads to an important behaviour of the series, i.e. order of lagged difference. In other words if the series is integrated to order k, i.e. I(k), k times lagged difference would yield a stationary series. The market indexes are normally found to be I(1)process, which means that the series will be stationary in the level of their first difference.

We, therefore, move on to determine whether the futures index series of various countries are stationary. In the event they are found to be non-stationary, we examine their difference to find out the level of their stationary. The Augmented Dicky Fuller test (ADF) is used for testing the existence of unit root, which involves estimating the equation[2] :

$$y_t = \gamma + \delta_t + \alpha\, y_{t-1} + \sum_{j=1}^{k} \theta_j\, \Delta y_{t-j} + e_t$$

We subject ADF test to index series of each country and examine the stationarity at the first difference levels. We also conduct Philips-Perron test and tabulate the results in Table - 2, which establish the hypothesis of existence of non stationarity of these series and additionally establish that the futures indexes are integrated to order one, i.e. I(1). As we find that the futures index series are all integrated to the same order, i.e. I(1), we run Johansen cointegration test to understand their underlying character of linear combinations. Our objective is to understand and integrate short run dynamics with long run equilibrium of the market, as it is well known that the stock markets are much affected by the short run dynamics.

As we find futures indexes are I(1) and in some cases cointegration relationships exist and accordingly they have long-run relationships which may have short-run deviations from the equilibrium. We in such cases apply Vector Error Correction Model (VECM) to evaluate causal relationships.

We also run the VAR (where series are not cointegrated), with a chosen lag with the intention to analyze the dynamic impact of random disturbances on the system of variables. We base our lag order selection criterion on various methods, e.g., Schwarz Information Criterion, Akaike Information Criterion, and Hann-Quinn Information Criterion. All of these tests yield a lag order of 2 (two). The results of the VAR and VECM are further examined by generalized impulse

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[2]. G.S. Madala, "Introduction To Econometrics", John Willey & Sons, 3rd Edition , p-549

response analysis of the variables. The impulse response is the measure of an impact of an innovation, i.e., an exogenous shock, in one variable that is transmitted through a VAR structure to other variables of a dynamic VAR. Characteristically, one standard deviation of innovation is applied at time *t* on a selected variable(*i th*) which is stretched to zero subsequently. The measured impact of the variable through the path followed in response to this change of the *i th* variable at time *t,* keeping the other variable unchanged, is called the impulse response of the *i th* variable. The impulse response function usually changes when the order of the VAR variables changes. To overcome this effect, generalized impulse response function is computed, where the impact of impulse response remains unchanged irrespective of the order of the VAR variables. The generalized function is conditional on observed forecast history of the variable. It is computed as the difference between the conditional expectations of random vector over n forecast horizon of a VAR and the exogenous shock applied to and the conditional expectation of the random vector over the observed forecast history during the period.

Data

The data on futures indexes (closing values) are collected over the period between April 1, 2002 and March 31, 2008 on daily basis, from Reuters. The spot index futures contracts are considered and if any of the selected markets is closed on some particular days, the observations on those days for the other futures indexes are discarded and not reckoned for analysis. The observations are taken on the basis of local individual currencies and are converted to their log values for analysis. The following world futures indexes are selected and the reasons for selecting these indexes are also appended:

American Continent	Futures Index
Brazil	BVSP (Bovespa) Futures
US	Dow Jones Futures
Mexico	IPC Futures
	Reasons
Brazil	Emerging market in Latin America
US	Dominating (Developed) market in the world
Mexico	Emerging market in Latin America

European Continent

France	CAC 40 Futures
Italy	S&P MIB Futures
UK	FTSE 100 Futures

	Reasons
France	Developed and leading market in Europe
Italy	Developed market in Europe
UK	Leading (Developed) stock market in Europe

Asian Continent

South Korea	Kospi 200 Futures
Singapore	MSCI SGX DT
India	Nifty Futures

	Reasons
South Korea	Developed market in Asia
Singapore	Developed market in Asia
India	Emerging market in Asia

Section III

Results

The correlation amongst the various stock futures indexes and their descriptive statistics are given in Panel A and B of Table 1 respectively.

The results show that the correlations amongst the futures markets exhibit regional linkage. The correlations are high for intra-regional futures markets, while the correlations are relatively low amongst inter-regions. In other words, inter-linkages as exhibited by the correlation coefficients are strong within the region, but less strong on region to region futures markets. For Asian futures markets, i.e., Korea, India and Singapore show greater correlations with Brazil, Mexico and US futures markets, when compared to France, Italy and UK futures markets. European futures markets also show relatively low correlations with

Asian futures markets. Incidentally, Indian futures market shows a high correlation similar to developed markets.

The descriptive statistics show high standard deviations for the emerging markets, like, Brazil, Mexico and India, when compared to developed futures markets. Accordingly, it appears that the associated risk is low in developed futures markets when compared to that of the emerging markets.

Though the correlation coefficient gives a preliminary idea on the co-movement of selected futures indexes over time, it is not possible to forecast and explain the effect of economic shocks from one futures index to another as they presumably are simultaneously dynamic in their movements, both in forward and reverse directions.

In order to examine the impact of such effect whether the futures indexes of the various selected countries have long run equilibrium, we conduct cointegration tests. The cointegration is based on non-stationarity of the indexes. To test the stationarity of futures indexes, we conduct ADF tests as well as Philips Perron tests and the results of the tests are given in Table - 2. The examination of the above table shows that all the series are of the order I(1), as expected.

Under this condition, we run the Johansen cointegration tests and the results of the tests are given in Table - 3.

Cointegration Analysis

The cointegration of American futures markets as given by Brazil, Mexico and US in Table – 3, shows that the null hypothesis of no cointegration is not rejected at 1% level of significance. In other words, these markets do not have long-run dynamic equilibrium amongst them. When we run cointegration test (Table – 4) of the futures indexes of France, Italy and UK, it has been found that null hypothesis of no cointegration is rejected at 1% level, and existence of at least one cointegrating vector is not rejected at 1% level of significance. In other words, there is long-run dynamic equilibrium amongst the European futures markets with at least one cointegrating vector. For the Asian futures markets (Table – 5), it is observed that the null hypothesis of no cointegration is not rejected and accordingly these markets do not have long-run dynamic equilibrium amongst them. The absence of long-run dynamic equilibrium amongst the futures markets in Asian region, could be a precursor for forming a good investment strategy for the global fund managers, since it would allow them to diversify the risk more efficiently, which partially may be the reason for India being chosen as the global destination of investible funds.

When the inter-region dynamic equilibrium relationships amongst the futures markets are examined, a different association is observed. The cointegrating relationship between European and American futures markets exhibits existence of dynamic equilibrium relationship (Table – 6). In contrast, the intra-American futures markets alone do not show cointegration amongst them.

The cointegrating relationship between Asian and American futures markets also show existence of cointegrating vectors amongst the futures indexes, as the hypothesis of no cointegration is rejected, while the null hypothesis of existence of at least one cointegrating vector is not rejected (Table – 7). Similar is the case between Asian and European futures markets. We observe that the null hypothesis of no cointegration is rejected at 1% level, and the null hypothesis of one cointegrating vector is not rejected. Accordingly, the Asian and European markets are also in a long-run dynamic equilibrium, connected with one cointegrating vector (Table – 8). The cointegration of all the selected futures markets reveals existence of cointegrating vector. Accordingly, a long-run dynamic relationship is observed via, at least one cointegrating vector, for all the selected futures indexes (Table – 9). The above observations give a crucial clue to the global fund managers. The diversification on global basis may not be suitable strategy for risk minimization. Fruitful diversification leading to risk minimization would occur if diversification on the basis of regional markets is resorted to where long run dynamic equilibrium is not present.

Granger Causality Analysis

To further investigate behaviour of cointegration amongst the futures indexes we subject the data to Granger Causality Test. The results are shown in Table – 10. The test results show that futures indexes of Brazil, Mexico, France, Italy, UK, India and Korea granger cause US futures index. It is therefore, apparent that changes of all the above futures indexes do not precede the changes in US future index. It is also observed that the Dow Jones futures, that is, the US futures index granger causes Brazil, Mexico and Italian futures indexes. In other words, changes in Dow Jones Futures index precede the above three futures indexes. The behaviour of, Nifty Futures, the Indian futures index is curious, as it is found that it fails to granger cause the futures markets of the Asian region, i.e., Korea and Singapore, but granger causes futures indexes of Brazil, Mexico, USA, France, Italy and UK. In American futures markets, it has been found that, BVSP Futures (Brazil futures index), granger causes futures indexes of Mexico, USA, France, Italy, UK, India, Korea and Singapore, while IPC Futures index (Mexico futures index) is found to granger cause, Dow Jones Futures and S&P MIB Futures, i.e., US and Italian futures indexes. In the European market, France and Italy have bi-directional relationship, while for France and UK, CAC 40 Futures, France futures index granger causes FTSE 100 Futures, i.e., UK futures index. But FTSE 100 Futures does not granger cause CAC 40 Futures. The results are curious and counter-intuitive, for which no convincing reason could be offered and accordingly, it requires further examination. In essence, the Granger Causality analysis shows that some relationship exists amongst the future indexes and such behavior may be captured in more detail through vector autoregression analysis (VAR). In the next section we attempt to analyze behaviour of the different futures indexes using VAR models.

Vector Autoregression Analysis

The VAR outputs given in Table - 11 on futures indexes of Brazil (BVSP Futures), Mexico (IPC Futures) and USA (Dow Jones Futures) show that one-day lag of both futures indexes of USA and Mexico causes significant impact on BVSP Futures index, but both their effect is far less than the effect of its one-day lagged information on BVSP Futures. For IPC Futures index one-day lag information on its own index is significant. We also find that Brazil and USA futures indexes make significant impact on it. The Dow Jones Futures index however shows significant one-day lag information impact by BVSP Futures, IPC Futures and by itself. It is important that amongst exogenous variables only Nifty (India) and MSCI SGX DT (Singapore) futures indexes are found to be significant. Significance of India partially supports the reason for investment in Indian markets by the global funds.

Since the European futures indexes, i.e., France (CAC 40 futures), Italy (S&P MIB futures) and UK (FTSE 100 Futures) are cointegrated with one cointegrating vector, the Vector Error Correction Model (VECM) is applied with one cointegrating restriction and the results are shown in Table – 12. It is observed that error correction term is small and close to zero. The short-run distortion to long run equilibrium is around 1%. Amongst the exogenous variables, the Asian futures indexes, particularly Kospi 200 Futures (Korean) and Nifty Futures (Indian) have statistically significant impact on the European futures indexes. The Korean impact is substantially higher than the Indian impact, while there is no significant impact of Singapore futures index.

The Asian futures indexes, i.e., Korea (Kospi200 Futures), India (Nifty Futures) and Singapore (MSCI SGX DT Futures) are found to be not cointegrated and accordingly there is no long run equilibrium amongst them. The unrestricted VAR is applied and the results are shown in Table – 13. The results reveal that impact of one-day lag information is statistically significant on individual futures index on its own, but there is no cross-sectional impact of one index on the other. In addition, impact of two-day lag information is significant on Singapore futures index only. Of the exogenous variables, BVSP Futures (Brazil) is observed to make high impact on all the Asian futures indexes, while the impact of USA is not found significant.

Since the European and American futures indexes are found to be cointegrated, the VECM is applied with cointegrating restriction. The results are tabulated in

Table – 14. The error terms are all close to zero and statistically significant. It signifies that the long run equilibrium of the futures indexes are sometimes distorted negatively on short-run basis by around 1.2 percent to around 3.8 percent. The effect of exogenous variables consisting of Asian futures indexes, particularly Nifty Futures (Indian futures index), is positive and statistically significant, but their impacts on European and American futures indexes are low.

As the European and Asian futures indexes are found to be cointegrated with at least one cointegrating vector, the VECM is applied and results are presented in Table – 15. The error correction term is statistically significant but small. The short-run deviations vary between 5.8% (for Nifty Futures – Indian Futures index) and 1.9% (for S&P MIB Futures - Italian futures index). Therefore long run equilibrium is not very much affected by the short run disequilibrium. The one-day lag is important for intra-region futures indexes but not significant for inter-region futures indexes. For instance, France futures index (CAC 40 Futures) is found to exert significant impact on its own index and on UK (FTSE 100 futures) but exerts no significant impact on Asian futures indexes. However, Singapore futures index has shown divergent behaviour. Its one-day lag is found to significantly impact all the European futures indexes, but not on Kospi 200 Futures (Korea) and Nifty Futures (India). Of the exogenous variables, Brazil is found to impact significantly all (European and Asian) futures indexes, while the Dow Jones Futures (US futures index) is found to impact significantly the European futures indexes but not any Asian futures index. It appears, therefore, that information is more efficiently absorbed in European futures markets rather than in Asian futures markets.

As we find that the Asian and American futures indexes are cointegrated, the VECM is applied to find out the nature of relationship. The results are shown in Table –16. The error correction term is small and statistically significant except for BVSP Futures (Brazil) and Nifty Futures (India). Accordingly, the short-run deviations from the long-run equilibrium are small and close to zero. The highest deviation is observed for Mexico futures index with 3.8% and the lowest is 1.8% for the Dow Jones Futures. The lag is found significant for intra-region futures indexes, for instance, USA, Brazil, Korea etc. are found to have significant one-day lag on specific region, that is, American region, while in Asian region, it is Korea. However, none of the exogenous variables has been found to be significant.

The VECM analysis of all the selected world futures markets shows (Table – 17) that all the error connection terms are close to zero. However, the error correction terms are statistically insignificant for all the futures indexes except those of France and Italy. The above evidences indicate that arbitrage opportunities exist amongst the selected world futures markets.

Generalized Impulse Response Analysis

In this section we examine the behaviour of generalized impulse response on a VAR structure. The shock on BVSP Futures (Brazil) influences the Mexico futures index to the extent of 17%, while for Dow Jones Futures (US), the change is only 9% during the initial time period (Fig. 1). The major impact of the shock is transmitted into the Brazil's own index. The effect of the shock diminishes progressively in US futures index and also in Brazil's own index, while for IPC Futures (Mexico) the aftereffect remains nearly the same over time. The shock on IPC Futures index reacts strongly on US futures index, around 28% while on Brazil it is only 14%. Subsequently, the response increases three fold on BVSP Futures, while on Dow Jones Futures, it diminishes. In both the future indexes, i.e., BVSP Futures and IPC Futures, there has been no appreciable effect on Dow Jones Futures Index.

The response of shock (Fig. 2) on France futures index shows an initial steep decrease followed by stable trend on its own index and on the S&P MIB (Italy) futures index while showing accelerated increase on FTSE 100 futures index (UK). It appears therefore that information on the CAC 40 Futures (France) is instantaneously absorbed by all the futures indexes including its own. It is also observed that shock on the S&P MIB futures index responds at around 15%, instantaneously for all the indexes including on its own and thereafter a flat trend is observed. Here also the shock is instantly reactive, establishing that information on S&P MIB futures index is efficiently absorbed and impact of such information on long term basis is no longer significant. The effect would only last for a maximum period of 5 months. The shocks on FTSE 100 futures index have a high positive response in the long run, though initially it declines. It appears therefore that even if the information on FTSE 100 futures index is discounted instantly, the effect of the shock is sustained increasingly over a longer period of time. It demonstrates the predominance of FTSE 100 futures index over the other futures indexes in Europe.

Shock on the Kospi 200 (Korea) future index is found to be transmitted predominantly on its own index. The response is found to influence 21% on Nifty (India) futures index, while it is 30% on MSCI SGX (Singapore) futures index. The shock response increases on Nifty futures index and decreases on MSCI futures index over time. It appears that information transmission on MSCI futures index is more efficient than that on Nifty futures index. For Nifty futures index the shock responds largely, being around 50%, on its own followed by MSCI SGX and Kospi 200 futures indexes, being 28% and 22% respectively. The response shows an initial increase on Kospi 200 futures index while on MSCI it slowly disintegrates over time. The shock response appears to have little influence over time on both the futures indexes of Singapore and Korea. The behaviour undermines the fact of the emergent nature of Nifty futures index. The shock response on MSCI SGX futures index transmits in an increasing manner both on

Kospi 200 and Nifty Futures index. The shock invokes large response on its own index which, however, decreases sharply over time. It appears that the information transmission on MSCI futures index is instantaneous and efficient as the aftermath of the shock on Nifty Futures and Kospi 200 Futures increases only around 5% over the entire time period. It is also apparent that Nifty Futures and Kospi 200 futures are less coordinated and the movement of Kospi 200 futures index is captured in a delayed manner on the Nifty futures index (Fig. 3).

When the inter-region impulse response analysis, consisting of American and European futures indexes, is undertaken, a unique shock response trend is observed for IPC Futures index (Fig. 4). The response is flat over longer period of time, while it records continuous diminishing impact over time for the other indexes. However, the initial impact is high for all the indexes. It appears, therefore, that the information of all other futures indexes is instantly discounted to a large extent and then gradually disintegrates over rest of the time period, while in case of IPC Futures index, further discounting of information does not take place after the initial reaction.

In case of American and Asian futures indexes, the shock on Nifty Futures index induces a flat trend on other futures indexes. It accordingly appears that the information of Nifty Futures index is absorbed during the initial short period only.

Further, when responses of Nifty Futures index on all the other futures indexes are examined, they are found similar to that shown by BVSP Futures index (Brazil), an emerging market. However, difference arises when the responses are compared with that shown by IPC Futures index (Mexico), another emerging futures market, on other indexes. Given the behaviour of the responses, it can be inferred that India appears to be emerging as an important futures market, much like a developed market in terms of efficient absorption of information (Fig. 5).

The inter-region analysis of Asian and European futures indexes reveals that the shock on CAC 40 futures index and FTSE 100 futures index displays identical response. Responses on Kospi 200 futures index and Nifty futures index are flat but initial responses are upward on Nifty Futures and downward on Kospi 200 Futures. It appears therefore that on inter-regional basis the information on Nifty Futures index is quickly absorbed over a short period of time (Fig. 6).

The graphs of the impulse response for the selected world future indexes are exhibited in Fig. 7. We observed that for shock on Brazil's future index (BVSP Futures) gives rise to 28% initial reaction on its own index and around 9% on IPC future index of Mexico, while it is 7.5% for USA. The largest impact is found on UK future index (FTSE 100 Futures) being around 11% followed by Singapore (MSCI SGX) at around10%. It is also observed that in the subsequent month the response impact has declined for all the future indexes except Italy, India and Singapore, in which cases further increase of impact is observed. We also observe rapid disappearance of response on the US future index. It appears, therefore, that the information on the movement of the Brazil's (BVSP) future index is discounted rapidly and more efficiently in the US futures index as compared to other indexes. In respect to other future indexes the response is slowly reduced over time. The evidence documented above shows that significance of the BVSP future index as an emerging market index.

The response impact is totally different for Mexico's IPC future index. The initial response for all the selected world future indexes has shown around two-fold jump from its initial response, while it is less than 4%, for Mexico on its own index. There has been no substantial increase of impulse response over subsequent time period. It indicates that initial information is swiftly discounted on all the selected indexes across the world and heralds emergence of IPC futures index as an important emergent futures index in the region.

The generalized impulse response impact on US future index (Dow-Jones Futures Index) shows low initial impact on all the future indexes except on its own and high increase on them in subsequent months. After the initial impact the response is found to be declining over the period in a gradual manner except on the future indexes of Singapore (MSCI SGX) and Mexico (IPC) where no further impact is observed. It appears, therefore, the information absorption is continuous and the effect is sustained over a longer period of time. The evidences establish the predominance of the Dow-Jones Futures Index, and confirming that the US futures market has a long run impact on the other futures indexes of the world.

In case of the European future indexes, we observe that the impulse response is disseminated more evenly amongst the European futures indexes, with respect to the futures indexes belonging to the other regions. The shock response shows that for France (CAC 40 Futures Index) there has been a moderate impact on its own index and a predominantly higher impact on Italy (S&P MIB Futures) and UK (FTSE 100 Futures) future indexes. Low impacts are found on American indexes and also on Asian future indexes, particularly on India (Nifty Futures). It underlies the fact that information absorption is relatively strong on European futures indexes rather than on American and Asian future indexes. The response has been found to reduce in a gradual manner for all the indexes except for Mexico (IPC) and Singapore (MSCI SGX). Similar response impact has been found for Italy (S&P MIB) and UK (FTSE 100) future indexes. The above facts reinforce the inference drawn on the cointegration of the European futures.

For the Asian market the impact response is more or less identical for all the futures indexes of the region. In respect of the Korean future index (Kospi 200 Futures Index) impulse response is high for the remaining futures indexes in Asia, low for the selected futures indexes in America and moderate for the selected futures indexes of the Europe. The impulse response of the Korean index is found to be low on the US future index. The highest response impact is found to be on French index. It does not undermine the relative efficiency of information discounting property of either Korean futures index or the US futures index; it is the reflection of less importance of Korean impact on US futures. For future index of India the impact is high on its own index signifying that local economic forces are more important for the movement of Indian future indexes rather than the impact of other indexes. It signifies that even if the India has opened up globally the information absorption is not so strong when compared to other developed markets. It is particularly important to mention that India's impact on US future index is low. When we analyze the impact response of Singapore (MSCI SGX Futures Index) it is found that regional impact is more predominant but has a large impact on European futures indexes, particularly those futures indexes of France and UK. It appears, therefore, that as a regional market, Singapore futures market exerts more influence in the European futures market when compared to other markets in Asia. It is, however, found that its response on US futures index is very low. With the rise of various emerging markets particularly India, the impact of Singapore is getting reduced because global fund managers are finding the emerging markets to be more rewarding. Therefore, influence of these markets has impacted in a bigger way and in the process the influence of developed markets is being reduced.

Conclusion

The central purpose of the paper is to study whether long term dynamic relationship exists amongst the futures indexes in the three continents, viz., American, European and Asian continents. Such understanding is important for global fund managers so that their investment decisions become more robust. A total of nine futures indexes are selected for investigation. The correlations among the future indexes on regional account are found to be strongly positive which is suggestive that the indexes are affected more on regional news rather than on world news. The futures indexes are found to be non-stationary and American and Asian futures markets are not cointegrated, while European futures markets are cointegrated. It implies that diversification and risk reduction is possible in American and Asian futures markets, but not in European futures markets on individual regional basis. It is, however, observed that the futures markets are cointegrated on inter-region basis, meaning thereby that long-term dynamic equilibrium relationship exists amongst the inter-region futures indexes, for instance, American and European, American and Asian, Asian and European futures markets. Granger Casualty test reveals that there lies directional relationship amongst various futures markets. The analysis is further extended to Vector Autoregression, which shows that error correction term is statistically significant but small and close to zero. It underlies the fact that the long-run equilibrium is affected by short-run deviations, but such deviations are small that quickly disappears into an equilibrium condition. The VAR analysis is followed by impulse response analysis. It shows that emerging market in American continent, i.e., Mexico futures market has a reflective effect on US Futures market while in

Europe, the FTSE 100 Futures index is predominating. For the European futures indexes, the France (CAC 40) and UK (FTSE 100) futures indexes are dynamically deviating on short-run basis as the shock transmits in a powerful manner over the time horizon, while it is found to be low for S&P MIB (Italian futures index), signifying thereby, short-term deviations are less in this case. In Asian region, Kospi 200 Futures is found to response comparatively higher with respect to Nifty Futures and MSCI SGX Futures. The knowledge on the nature of inter-linkages amongst various futures markets revealed in our study is useful for the global fund managers in their effort to diversify risk, as cointegrated markets give little opportunity to minimize the risk through diversifications. Nevertheless, since the cointegration is also useful to find out arbitrage opportunity, the fund managers can exploit such opportunities available in the futures markets to their advantages by understanding the nature and extent of short-run deviations from equilibrium, as revealed in our study. The results are also important pointers to the policy makers as the desired impact of introduction of regulatory or deregulatory measures could be affected due to underlying linkages, whose cumulative effect may remain hidden and which could jeopardize the policy framework. The policy makers may be required to incorporate these far reaching consequences into their policy decisions model.

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Table - 1

Panel - A

Correlation Coefficients of the Futures Indexes of the selected countries

	BRAZIL	MEXICO	USA	FRANCE	ITALY	UK	KOREA	INDIA	SINGAPORE
BRAZIL	1.000000	0.974762	0.928497	0.903663	0.832610	0.921187	0.966566	0.982533	0.960008
MEXICO	0.974762	1.000000	0.945772	0.958989	0.911411	0.965855	0.967772	0.974065	0.974558
USA	0.928497	0.945772	1.000000	0.900069	0.842687	0.892109	0.904596	0.915217	0.971523
FRANCE	0.903663	0.958989	0.900069	1.000000	0.977718	0.992756	0.941694	0.922025	0.935628
ITALY	0.832610	0.911411	0.842687	0.977718	1.000000	0.970890	0.878412	0.858537	0.882185
UK	0.921187	0.965855	0.892109	0.992756	0.970890	1.000000	0.955703	0.939507	0.936551
KOREA	0.966566	0.967772	0.904596	0.941694	0.878412	0.955703	1.000000	0.971898	0.947986
INDIA	0.982533	0.974065	0.915217	0.922025	0.858537	0.939507	0.971898	1.000000	0.951888
SINGAPORE	0.960008	0.974558	0.971523	0.935628	0.882185	0.936551	0.947986	0.951888	1.000000

Panel - B

Descriptive Statistics of the Futures Indexes of the selected countries

	BRAZIL	MEXICO	USA	FRANCE	ITALY	UK	KOREA	INDIA	SINGAPORE
Mean	4.392436	4.111731	4.020509	3.615011	4.541554	3.698076	2.113892	3.322061	3.311762
Median	4.395318	4.097604	4.020133	3.605359	4.551730	3.693881	2.077368	3.297301	3.300610
Maximum	4.821500	4.517183	4.153418	3.788875	4.641127	3.830589	2.423246	3.798530	3.583334
Minimum	3.925518	3.746245	3.862131	3.380934	4.408884	3.514282	1.816241	2.967408	3.068501
Std. Dev.	0.245194	0.245176	0.064045	0.098700	0.062505	0.077009	0.154929	0.237554	0.131841
Skewness	-0.078588	0.173116	-0.021031	0.011200	-0.316269	0.006964	0.204288	0.157837	0.241888
Kurtosis	1.936901	1.676144	2.485831	1.856864	2.002262	1.793072	1.876715	1.843384	2.139204
Jarque-Bera	64.67351	105.0924	14.94814	73.80585	49.42694	82.31316	79.35250	79.77630	54.60050
Probability	0.000000	0.000000	0.000568	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Table - 2

ADF and Philips-Perron Test Results

	ADF Test Statistic			Philips-Perron Statistic	
	In the level	In the level of first difference		In the level	In the level of first difference
Brazil (lag length 0)	-1.0824	-37.1995	Bandwidth 11	-1.0708	-37.363
Mexico (lag length 0)	-1.2654	-35.2167	Bandwidth 7	-1.2759	-35.21
USA (lag length 0)	-1.5444	-38.8281	Bandwidth 16	-1.4549	-38.9686
France (lag length 0)	-1.1085	-38.4545	Bandwidth 23	-0.9122	-39.1341
Italy (lag length 0)	0.0895	-30.6461	Bandwidth 2	0.1364	-30.6461 (Bandwidth 0)
UK (lag length 1)	-1.1838	-39.9463 (lag length 0)	Bandwidth 12	-1.067	-40.2673 (Bandwidth 11)
Korea (lag length 0)	-1.4585	-37.778	Bandwidth 8	-1.4348	-37.8927
India (lag length 0)	-1.0754	-37.578	Bandwidth 8	-1.072	-37.5886 (Bandwidth 4)
Singapore (lag length 1)	-1.016	-38.3342 (lag length 0)	Bandwidth 5	-1.091	-38.2883 (Bandwidth 7)
	Critical Values				
	1%	-3.4351		-3.4351	
	5%	-2.8635		-2.8635	
	10%	-2.5679		-2.5679	

For the Futures Indexes of all the selected countries

1. Lag length is automatically selected based on SIC (Schwarz info criterion) for ADF test.
2. Bandwidth is automatically selected by Newey-West method using Barlett kernel for PP test.

Table - 3

Johansen Cointegration Results
For the Futures Indexes of Brazil, Mexico and USA

Trend assumption : Linear deterministic trend with intercept

Lag interval 1 to 4

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Trace Statistic	at 5%	at 1%	
r = 0	r = 1	0.0105	23.005	29.68	35.65	Do not reject
r = 1	r = 2	0.008456	10.80759	15.41	20.04	
r = 2	r = 3	0.000865	0.9992	3.76	6.65	

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Max-Eigen Value Statistic	at 5%	at 1%	
r = 0	r > 0	0.0105	12.19743	20.97	25.52	Do not reject
r ≤ 1	r > 1	0.008456	9.8083	14.07	18.63	
r ≤ 2	r = 2	0.000865	0.99924	3.76	6.65	

1. The rank of the cointegration matrix is r, representing the number of cointegrating vectors.
2. Ho and H1 are null and alternative hypothesis respectively.

Table - 4

Johansen Cointegration Results
For the Futures Indexes of France, Italy and UK

Trend assumption : Linear deterministic trend with intercept

Lag interval 1 to 4

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Trace Statistic	at 5%	at 1%	
r = 0	r = 1	0.039455	45.41609	29.68	35.65	Reject at 1% level
r = 1	r = 2	0.012705	11.4015	15.41	20.04	Do not reject
r = 2	r = 3	0.000706	0.596991	3.76	6.65	

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Max-Eigen Value Statistic	at 5%	at 1%	
r = 0	r > 0	0.039455	34.014591	20.97	25.52	Reject at 1% level
r ≤ 1	r > 1	0.012705	10.80451	14.07	18.63	Do not reject
r ≤ 2	r = 2	0.000706	0.596991	3.76	6.65	

1. The rank of the cointegration matrix is r, representing the number of cointegrating vectors.
2. Ho and H1 are null and alternative hypothesis respectively.

Table - 5

Johansen Cointegration Results
For the Futures Indexes of Korea, India and Singapore

Trend assumption : Linear deterministic trend with intercept

Lag interval 1 to 4

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Trace Statistic	at 5%	at 1%	
r = 0	r = 1	0.012249	19.82964	29.68	35.65	Do not reject
r = 1	r = 2	0.005638	6.592605	15.41	20.04	
r = 2	r = 3	0.000484	0.520053	3.76	6.65	

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Max-Eigen Value Statistic	at 5%	at 1%	
r = 0	r > 0	0.012249	13.23704	20.97	25.52	Do not reject
r ≤ 1	r > 1	0.005638	6.072552	14.07	18.63	
r ≤ 2	r = 2	0.000484	0.520053	3.76	6.65	

1. The rank of the cointegration matrix is r, representing the number of cointegrating vectors.
2. Ho and H1 are null and alternative hypothesis respectively.

Table - 6

Johansen Cointegration Results
For the Futures Indexes of Brazil Mexico USA France Italy UK

Trend assumption : Linear deterministic trend with intercept

Lag interval 1 to 4

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Trace Statistic	at 5%	at 1%	
r = 0	r = 1	0.074343	139.7236	94.15	103.18	Reject at 1% level
r = 1	r = 2	0.040085	74.44596	68.52	76.07	Reject at 5% level
r = 2	r = 3	0.027841	32.87644	47.21	54.46	Do not reject
r = 3	r = 4	0.010473	16.0168	29.68	35.85	
r = 4	r = 5	0.005561	7.12076	15.41	20.64	
r = 5	r = 6	0.002846	2.408341	3.76	6.65	

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Max-Eigen Value Statistic	at 5%	at 1%	
r = 0	r > 0	0.074343	65.27766	39.37	45.1	Reject at 1% level
r ≤ 1	r > 1	0.040085	34.56951	33.46	38.77	Reject at 5% level
r ≤ 2	r > 2	0.027841	23.83965	27.07	32.24	Do not reject
r ≤ 3	r > 3	0.010473	8.896038	20.97	25.52	
r ≤ 4	r > 4	0.005561	4.712418	14.07	18.63	
r ≤ 5	r = 5	0.002846	2.408314	3.76	6.65	

1. The rank of the cointegration matrix is r, representing the number of cointegrating vectors.
2. Ho and H1 are null and alternative hypothesis respectively.

Table - 7

Johansen Cointegration Results
For the Futures Indexes of Brazil Mexico USA Korea India Singapore

Trend assumption : Linear deterministic trend with intercept

Lag interval 1 to 4

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Trace Statistic	at 5%	at 1%	
r = 0	r = 1	0.043207	87.45529	94.15	103.18	Do not reject
r = 1	r = 2	0.021427	42.4079	68.52	76.07	
r = 2	r = 3	0.016459	20.70463	47.21	54.46	
r = 3	r = 4	0.003989	5.093867	29.68	35.85	
r = 4	r = 5	0.000914	1.089155	15.41	20.64	
r = 5	r = 6	0.000172	0.17275	3.76	6.65	

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Max-Eigen Value Statistic	at 5%	at 1%	
r = 0	r > 0	0.043207	45.04739	39.37	45.1	Reject at 5% level
r ≤ 1	r > 1	0.021427	21.70327	33.46	38.77	Do not reject
r ≤ 2	r > 2	0.016459	15.61077	27.07	32.24	
r ≤ 3	r > 3	0.003989	4.004711	20.97	25.52	
r ≤ 4	r > 4	0.000914	0.9164	14.07	18.63	
r ≤ 5	r = 5	0.000172	0.172755	3.76	6.65	

1. The rank of the cointegration matrix is r, representing the number of cointegrating vectors.
2. Ho and H1 are null and alternative hypothesis respectively.

Table – 8

Johansen Cointegration Results
For the Futures Indexes of France Italy UK Korea India Singapore

Trend assumption : Linear deterministic trend with intercept

Lag interval 1 to 4

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Trace Statistic	at 5%	at 1%	
r = 0	r = 1	0.065487	114.5411	94.15	103.18	Reject at 1% level
r = 1	r = 2	0.037671	58.93517	68.52	76.07	Do not reject
r = 2	r = 3	0.016542	27.40999	47.21	54.46	
r = 3	r = 4	0.008262	13.71512	29.68	35.85	
r = 4	r = 5	0.006677	6.904249	15.41	20.64	
r = 5	r = 6	0.001709	1.404369	3.76	6.65	

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Max-Eigen Value Statistic	at 5%	at 1%	
r = 0	r > 0	0.065487	55.60597	39.37	45.1	Reject at 1% level
r ≤ 1	r > 1	0.037671	31.52518	33.46	38.77	Do not reject
r ≤ 2	r > 2	0.016542	13.69487	27.07	32.24	
r ≤ 3	r > 3	0.008262	6.81087	20.97	25.52	
r ≤ 4	r > 4	0.006677	5.49988	14.07	18.63	
r ≤ 5	r = 5	0.001709	1.40437	3.76	6.65	

1. The rank of the cointegration matrix is r, representing the number of cointegrating vectors.
2. Ho and H1 are null and alternative hypothesis respectively.

Table - 9

Johansen Cointegration Results
For the Futures Indexes of all the selected world markets

Trend assumption : Linear deterministic trend with intercept

Lag interval 1 to 4

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Trace Statistic	at 5%	at 1%	
r = 0	r = 1	0.096022	245.6507	192.89	204.95	Reject at 1% level
r = 1	r = 2	0.60667	162.7705	156	168.36	Reject at 5% level but not at 1% level
r = 2	r = 3	0.04668	111.3878	124.24	133.57	Do not reject
r = 3	r = 4	0.030874	72.13994	94.15	103.18	
r = 4	r = 5	0.021761	46.39268	68.52	76.07	
r = 5	r = 6	0.013527	28.32953	47.21	54.46	
r = 6	r = 7	0.011439	17.14778	29.68	35.85	
r = 7	r = 8	0.007659	7.702116	15.41	20.64	
r = 8	r = 9	0.001691	1.389627	3.76	6.65	

Hypothesis				Critical Values		Inference
Ho	H1	Eigenvalues	Max-Eigen Value Statistic	at 5%	at 1%	
r = 0	r > 0	0.096022	82.88024	57.12	62.8	Reject at 1% level
r ≤ 1	r > 1	0.60667	51.38265	51.42	57.69	Do not reject
r ≤ 2	r > 2	0.04668	39.24789	45.28	51.57	
r ≤ 3	r > 3	0.030874	25.74726	39.37	45.1	
r ≤ 4	r > 4	0.021761	18.06315	33.46	38.77	
r ≤ 5	r > 5	0.013527	11.18175	27.07	32.24	
r ≤ 6	r > 6	0.011439	9.445661	20.97	25.52	
r ≤ 7	r > 7	0.007659	6.312489	14.07	18.63	
r ≤ 8	r = 8	0.001691	1.389627	3.76	6.65	

1. The rank of the cointegration matrix is r, representing the number of cointegrating vectors.
2. Ho and H1 are null and alternative hypothesis respectively.

Table - 10

Granger Casualty Results

F- Statistic

← Does not Granger Cause ↓	BRAZIL	MEXICO	USA	FRANCE	ITALY	UK	KOREA	INDIA	SINGAPORE
BRAZIL	-	132.377*	136.833*	51.822*	39.217*	54.751*	17.227*	18.569*	16.703*
MEXICO	2.978	-	11.971*	0.4005	11.502*	0.815	0.537	1.237	0.009
USA	5.611*	8.146*	-	0.474	3.208*	0.157	1.601	0.3786	1.738
FRANCE	1.821	12.807*	94.373*	-	7.389*	6.781*	0.0789	0.884	0.5482
ITALY	1.369	5.112*	38.695*	4.478*	-	3.356*	0.554	2.394	2.269
UK	1.359	9.677*	75.753*	1.355	9.973*	-	0.399	0.373	0.121
KOREA	1.105	50.852*	102.028*	33.916*	30.306*	42.779*	-	2.615	74.793*
INDIA	5.629*	20.070*	26.405*	5.525*	15.461*	9.425*	2.521	-	1.546
SINGAPORE	2.311	56.722*	90.75*	14.154*	22.417*	23.836*	3.256*	1.247	-

* significant at 1% level.

Table - 11

Vector Autoregression Estimates
For Futures Indexes of Brazil, Mexico and USA

	Brazil	Std-Error	t-statistic	Mexico	Std-Error	t-statistic	USA	Std-Error	t-statistic
Endogenous variable									
Brazil (-1)	0.97039	0.2909	33.3586	0.28742	0.01796	16.0047	0.2119	0.0138	15.413
Brazil (-2)	0.02103	0.02928	0.71828	-0.2822	0.0181	-15.614	-0.2056	0.0138	-14.861
Mexico (-1)	0.042674	0.65299	0.80525	1.0114	0.0327	30.913	0.054	0.025	2.1551
Mexico (-2)	-0.03172	0.05295	-0.5991	-0.0173	0.03269	-0.5303	-0.0566	0.025	-2.2614
USA (-1)	-0.21007	0.06844	0.04225	-0.1646	0.0423	-3.8953	0.8462	0.0323	26.163
USA (-2)	0.19726	0.0683	2.8865	0.1657	0.0422	3.928	0.1394	0.0323	4.316
Exogenous variable									
France	0.03341	0.0412	0.81089	0.5239	0.0276	1.9009	0.25296	0.01699	1.4889
Italy	-0.1065	0.0311	-0.3423	0.01431	0.0208	0.6875	0.0044	0.0128	0.3447
UK	-0.0835	0.0592	-1.4121	-0.2883	0.03957	-0.7286	-0.0193	0.0244	-0.7894
Korea	0.0188	0.01299	1.4509	0.00174	-0.0087	0.20064	-0.0043	0.00536	-0.8074
India	0.0508	0.00994	5.1135	0.01247	0.0067	1.8752	0.00997	0.0041	2.432
Singapore	0.0872	0.0173	5.1135	0.05601	0.0116	4.8372	0.0436	0.0071	6.102

Table – 12

Vector Error Correction Estimates

For Futures Indexes of France, Italy and UK

	D(France)	Std-Error	t-statistic	D(Italy)	Std-Error	t-statistic	D(UK)	Std-Error	t-statistic
Endogenous variable									
D(France (-1))	-0.204	0.0416	-2.424	-0.412	0.072	-0.572	-0.1596	0.072	-2.232
D(France (-2))	-0.2149	0.0846	-2.540	-0.1316	0.0724	-1.817	-0.1372	0.0719	-1.109
D(Italy (-1))	0.1651	0.0801	2.062	0.0293	0.0685	0.4271	0.1311	0.068	1.928
D(Italy (-2))	-0.0053	0.0802	-0.066	-0.0264	0.0687	-0.385	0.0198	0.0681	0.2911
D(UK (-1))	-0.0475	0.0859	-0.553	-0.0701	-0.074	-0.953	-0.4713	-0.073	-0.646
D(UK(-2))	0.261	0.0855	3.054	0.0193	0.0732	2.634	0.1509	0.073	2.078
Exogenous variable									
Brazil	0.0047	0.0061	0.7745	0.0098	0.0052	1.881	0.0027	0.0052	0.0523
Mexico	-0.0092	0.006	-1.542	-0.0052	0.0051	-1.012	-0.0026	0.0051	-0.519
USA	-0.0251	0.0153	-1.636	-0.0331	0.0131	-2.518	-0.0198	0.013	-1.52
Korea	0.0347	0.007	4.996	0.0211	0.006	3.54	0.0322	0.0059	5.467
India	0.0163	0.0056	2.8966	0.0101	0.0048	2.102	0.0139	0.0048	2.913
Singapore	0.0164	0.0098	1.665	0.0161	0.0084	1.912	0.0091	0.0083	1.087
Error Correction term	0.0142	0.0017	8.414	0.0104	0.0014	7.164	0.0135	0.0014	9.429

Table – 13

Vector Autoregression Estimates
For Futures Indexes of Korea, India and Singapore

	Korea	Std-Error	t-statistic	India	Std-Error	t-statistic	Singapore	Std-Error	t-statistic
Endogenous variable									
Korea (-1)	0.923	0.0463	19.946	0.06	0.056	1.12	0.0073	0.0327	0.0229
Korea (-2)	0.018	0.046	0.3996	-0.1	0.0558	-1.793	-0.035	0.033	-1.075
India (-1)	0.026	0.035	0.744	0.86	0.042	20.243	-0.008	0.247	-0.325
India (-2)	-0.03	0.0351	-0.8847	0.11	0.043	2.429	-0.0042	0.0248	-0.17
Singapore (-1)	-0.16	0.0694	-2.289	-0.01	0.084	-0.01476	0.824	0.049	16.722
Singapore (-2)	0.111	0.0696	1.592	-0.04	0.0842	-0.5207	0.0143	0.049	2.908
Exogenous variable									
Brazil	0.069	0.0121	5.744	0.07	0.0146	4.812	0.0556	0.0085	6.525
Mexico	-0.03	0.0128	-2.3805	0.01	0.054	0.8551	-0.0261	0.009	-2.888
USA	0.022	0.026	0.824	-0.01	0.0316	-0.02376	0.0158	0.0184	0.8537
France	0.103	0.0369	2.7961	0.09	0.045	2.036	0.0545	0.0261	2.088
Italy	-0.03	0.0283	-1.2262	-0.23	0.034	-0.673	-0.0218	0.02	-1.089
UK	0.196	0.054	0.3622	-0.03	0.0655	-0.4651	0.032	0.0383	0.8363

Table - 14

Vector Error Correction Estimates for Futures Indexes of Brazil, Mexico, USA, France, Italy and UK

	D(Brazil)	Std-Error	t-statistic	D(Mexico)	Std-Error	t-statistic	D(USA)	Std-Error	t-statistic
Endogenous variable									
D(Brazil (-1))	-0.06345	0.03657	-1.735	0.341	0.0247	13.805	0.1585	0.0196	8.1035
D(Brazil (-2))	-0.00679	0.0401	-0.169	0.0938	0.0271	3.4677	0.5603	0.0163	3.4368
D(Mexico (-1))	0.01965	0.0633	0.3104	-0.0357	0.0428	-0.8352	0.0051	0.0258	0.1976
D(Mexico (-2))	-0.0459	0.6027	-0.762	-0.07738	0.04071	-1.9009	-0.0337	0.0245	-1.3762
D(USA(-1))	-0.2321	0.1058	-2.194	-0.4084	0.0714	-5.718	-0.3319	0.043	-7.8797
D(USA(-2))	-0.00547	0.1027	-0.053	0.13367	0.06093	1.928	0.1045	0.0418	0.2501
D(France (-1))	-0.3156	0.1471	-2.145	0.01994	0.0994	0.2007	0.1448	0.06	2.419
D(France (-2))	-0.1739	0.1493	-1.164	0.17205	0.1009	1.7058	0.083	0.061	1.3655
D(Italy (-1))	0.4565	0.1395	3.2739	0.1369	0.0942	1.4538	0.1112	0.0567	1.9596
D(Italy (-2))	0.0007	0.14091	0.0048	-0.0621	0.0952	-0.6528	-0.0078	0.0573	-0.1362
D(UK (-1))	0.0665	0.1554	0.4279	-0.021	0.105	0.2022	-0.037	0.0632	-0.5852
D(UK(-2))	0.3207	0.1545	2.0755	0.0126	0.1044	0.1211	-0.0099	0.0629	-0.1581
Exogenous variable									
Korea	0.04912	0.011	4.4874	0.0317	0.0074	4.4885	0.017	0.0045	3.81
India	0.044	0.0082	5.3425	0.0121	0.0056	2.1676	0.0126	0.0034	3.7456
Singapore	0.0819	0.0133	6.1799	0.0526	0.00896	6.17088	0.0324	0.0054	6.009
Error Correction term	-0.0382	0.0039	-9.709	-0.0196	0.0027	-7.3648	-0.01297	0.0016	-8.0816

Table – 14 (Contd.)

Vector Error Correction Estimates for Futures Indexes of Brazil, Mexico, USA, France, Italy and UK

	D(France)	Std-Error	t-statistic	D(Italy)	Std-Error	t-statistic	D(UK)	Std-Error	t-statistic
Endogenous variable									
D(Brazil (-1))	0.1585	0.0196	8.1035	0.1327	0.0168	7.9002	0.1385	0.0166	8.3328
D(Brazil (-2))	0.0379	0.0214	1.769	0.4721	0.0184	2.7657	0.3551	0.0182	1.9502
D(Mexico (-1))	0.00127	0.0339	0.0376	-0.0053	0.0291	-0.1819	-0.0051	0.2877	-0.177
D(Mexico (-2))	0.02758	0.0322	0.8555	0.3496	0.02768	1.2629	0.2586	0.02739	0.9492
D(USA(-1))	0.0013	0.0566	0.023	-0.0265	0.0486	-0.5452	-0.0112	0.0481	-0.233
D(USA(-2))	0.04962	0.0549	0.9036	0.0079	0.0472	0.1678	0.04636	0.467	0.9937
D(France (-1))	-0.2494	0.0787	-3.1695	-0.0885	0.068	-1.31	-0.1989	0.0669	-2.975
D(France (-2))	-0.1989	0.0799	-2.49	-0.1277	0.0686	-0.8617	-0.1185	0.0679	-1.746
D(Italy (-1))	0.1886	0.0746	2.5287	0.0601	0.0641	0.9386	1.5717	0.0634	2.4803
D(Italy (-2))	-0.0524	0.0754	-0.6953	-0.0498	0.0647	-0.7695	-0.0193	0.064	-0.301
D(UK (-1))	-0.1633	0.0832	-1.964	-0.158	0.0714	-2.2138	-0.1476	0.071	-2.09
D(UK(-2))	0.2133	0.0827	2.5802	0.149	0.071	2.0994	0.0993	0.07	1.4138
Exogenous variable									
Korea	0.2822	0.00586	4.8194	0.0197	0.00503	3.9206	0.0249	0.00497	5.0059
India	0.02764	0.00441	6.2725	0.0232	0.0038	6.1221	0.0241	0.0037	6.4349
Singapore	0.0555	.0.0071	7.824	0.0429	0.0061	7.035	0.04838	0.006	8.0289
Error Correction term	-0.02336	0.0021	-11.075	-0.0178	0.0018	-9.8507	-0.0205	0.0018	-11.43

Table - 15

Vector Error Correction Estimates for Futures Indexes of France, Italy, UK, Korea, India and Singapore

	D(France)	Std-Error	t-statistic	D(Italy)	Std-Error	t-statistic	D(UK)	Std-Error	t-statistic
Endogenous variable									
D(France (-1))	-0.2737	0.08561	-3.1971	-0.1056	0.0729	-1.4483	-0.02379	0.0716	-3.3228
D(France (-2))	-0.214	0.0864	-2.4765	-0.1191	0.0736	-1.6191	-0.1383	0.0722	-1.9145
D(Italy (-1))	0.2267	0.0805	2.8183	0.8004	0.0685	1.1685	0.186	0.0673	2.7648
D(Italy (-2))	0.01965	0.0806	0.2436	-0.0063	0.0687	-0.0923	0.0426	0.06742	0.6323
D(UK (-1))	-0.2169	0.08755	-2.4776	-0.1914	0.0746	-2.5676	-0.1869	0.0732	-2.5533
D(UK(-2))	0.1778	0.0862	2.0622	0.1327	0.0734	1.8078	0.95	0.0721	1.318
D(Korea (-1))	0.09749	0.0289	3.3758	0.1008	0.0246	4.099	0.07403	0.02415	3.0656
D(Korea (-2))	-0.02216	0.0219	-0.7619	-0.0227	0.0248	-0.9176	-0.0429	0.0243	-1.7639
D(India (-1))	-0.0121	0.0225	-0.5457	-0.0061	0.0189	-0.5232	-0.0044	0.0186	-0.2348
D(India (-2))	0.02971	0.0221	1.3457	0.02586	0.0188	1.3759	0.0277	0.0185	1.5014
D(Singapore (-1))	0.`155	0.0448	3.4624	0.0971	0.0381	2.5476	0.1744	0.0374	4.6589
D(Singapore (-2))	0.0527	0.0453	1.1641	0.01105	0.03856	0.2865	0.04307	0.0379	1.1375
Exogenous variable									
Brazil	0.0306	0.0055	5.6002	0.02432	0.0047	5.2307	0.02855	0.0046	6.2514
Mexico	-0.107	0.0047	-2.2644	-0.00904	0.00402	-2.2468	-0.00617	0.00395	-1.5623
USA	0.0273	0.011	2.4763	0.0083	0.0094	0.8894	0.0274	0.0092	2.9815
Error Correction term	0.3337	0.0065	5.1788	0.01939	0.0056	3.4957	0.0386	0.0055	7.088

Table – 15 (Contd.)

Vector Error Correction Estimates for Futures Indexes of France, Italy, UK, Korea, India and Singapore

	D(Korea)	Std-Error	t-statistic	D(India)	Std-Error	t-statistic	D(Singapore)	Std-Error	t-statistic
Endogenous variable									
D(France (-1))	-0.0689	0.1389	-0.4961	0.0923	0.1676	0.5508	0.019	0.0971	-0.1959
D(France (-2))	-0.138	0.1402	-0.9818	-0.1068	0.1691	-0.6314	-0.1797	0.098	-1.8346
D(Italy (-1))	0.1892	0.1305	1.4495	0.2717	0.1575	1.7252	0.1534	0.0912	1.6818
D(Italy (-2))	0.01785	0.1308	0.1364	0.2528	0.1578	1.6017	0.0457	0.0914	0.5202
D(UK (-1))	-0.0014	0.1421	-0.01	-2405	0.1714	-1.4031	-0.041	0.0993	-0.4129
D(UK(-2))	0.2576	0.1399	1.8422	-0.0598	0.1687	-0.3541	0.1939	0.0977	1.9842
D(Korea (-1))	-0.0734	0.0469	-1.5659	0.0485	0.05653	0.8578	-0.0047	0.0328	-0.1444
D(Korea (-2))	-0.1912	0.0472	-4.0519	-0.1463	0.0569	-2.5692	-0.1375	0.033	-4.1706
D(India (-1))	0.0323	0.0361	0.895	-0.1341	0.0436	-3.0793	-0.0057	0.0252	-0.2262
D(India (-2))	0.0758	0.0358	2.1171	-0.0301	0.0432	-0.6973	0.0586	0.025	2.3419
D(Singapore (-1))	-0.0972	0.0726	-1.3391	0.041	0.0876	0.4679	-0.1282	0.0508	-2.5257
D(Singapore (-2))	0.0492	0.0735	0.6699	0.0472	0.0886	0.5327	0.0268	0.0514	0.521
Exogenous variable									
Brazil	0.4531	0.0089	5.1139	0.0379	0.0107	3.5496	0.0405	0.0062	6.4586
Mexico	-0.0135	0.0077	-1.7596	0.0039	0.0093	0.4164	-0.0133	0.0054	-2.4828
USA	0.01298	0.0179	0.7263	-0.0055	0.0216	-0.2558	0.0036	0.0125	0.2868
Error Correction term	0.04699	0.0106	4.4459	0.0579	0.0128	4.5407	0.0364	0.0074	4.9262

Table - 16

Vector Error Correction Estimates for Futures Indexes of Korea, India, Singapore, Brazil, Mexico and USA

	D(Korea)	Std-Error	t-statistic	D(India)	Std-Error	t-statistic	D(Singapore)	Std-Error	t-statistic
Endogenous variable									
D(Korea (-1))	-0.9342	0.0471	-1.9839	0.03167	0.05709	0.5548	-0.0101	0.0331	-0.3055
D(Korea (-2))	-0.1666	0.0472	-3.3531	-0.1195	0.05722	-2.0878	-0.1176	0.0332	-3.5409
D(India (-1))	0.0554	0.0355	1.5619	-0.1009	0.043	-2.345	0.0153	0.025	0.6117
D(India (-2))	0.0879	0.352	2.499	-0.0214	0.0426	-0.5014	0.0651	0.0247	2.6295
D(Singapore(-1))	-0.1995	0.0717	-2.7821	-0.0601	0.0869	-0.691	-0.202	0.0505	-4.003
D(Singapore(-2))	-0.0035	0.0726	0.0482	-0.0305	0.088	-0.347	-0.0161	0.0511	-0.3146
D(Brazil (-1))	0.1749	0.0351	4.9846	0.2116	0.0425	4.9746	0.1194	0.0247	4.8356
D(Brazil (-2))	0.0282	0.0374	0.7547	-0.0044	0.0453	-0.0976	0.018	0.0263	0.6861
D(Mexico (-1))	0.00057	0.0581	0.00976	0.039	0.0704	0.5541	0.00016	0.0409	0.0039
D(Mexico (-2))	0.0385	0.0549	0.7007	0.1457	0.0665	2.1897	0.0626	0.0386	1.6219
D(USA (-1))	-0.0274	0.0923	-0.2973	-0.104	0.1119	-0.93	-0.0728	0.0649	-1.1205
D(USA(-2))	0.0565	0.0911	0.6211	-0.0318	0.1104	-2.2879	-0.0115	0.0641	-0.1789
Exogenous variable									
France	0.0453	0.0329	1.3797	0.0259	0.0398	0.65	0.016	0.023	0.6936
Italy	-0.019	0.01934	-0.9819	-0.0091	0.2345	-0.3863	-0.0223	0.0136	-1.638
UK	0.0118	0.0369	0.3209	-0.0207	0.0448	-0.4631	0.04625	0.026	1.7802
Error Correction term	-0.00857	0.003	-2.8663	-0.00091	0.0036	-0.2506	-0.0073	0.0021	-3.4663

Table – 16 (Contd.)

Vector Error Correction Estimates for Futures Indexes of Korea, India, Singapore, Brazil, Mexico and USA

	D(Brazil)	Std-Error	t-statistic	D(Mexico)	Std-Error	t-statistic	D(USA)	Std-Error	t-statistic
Endogenous variable									
D(Korea (-1))	-0.0127	0.055	-0.233	0.0537	0.0342	1.5675	0.0697	0.0209	3.335
D(Korea (-2))	-0.0396	0.0547	-0.7241	-0.0545	0.0343	-1.59	-0.0345	0.021	-1.6495
D(India (-1))	0.0433	0.0411	1.0527	0.0268	0.0258	1.04	0.0056	0.0157	0.3588
D(India (-2))	0.0274	0.0408	0.6728	0.0442	0.0256	1.73	0.0416	0.0156	2.668
D(Singapore(-1))	0.0377	0.0831	0.4541	0.1563	0.0521	2.9979	0.1309	0.0318	4.1149
D(Singapore(-2))	0.065	0.0841	0.7733	0.0594	0.0527	1.1272	0.0839	0.0322	2.6055
D(Brazil (-1))	-0.0323	0.041	-0.795	0.2777	0.0255	10.8892	0.1256	0.0156	8.0704
D(Brazil (-2))	0.0035	0.0433	0.0801	0.0737	0.0271	2.7157	0.036	0.0166	2.1755
D(Mexico (-1))	0.008	0.0673	0.12	-0.0589	0.0422	-1.3947	-0.0005	0.0258	-0.019
D(Mexico (-2))	-0.0256	0.0636	-0.402	-0.0465	0.0399	-1.1666	-0.0311	0.0243	-1.2771
D(USA (-1))	-0.2474	0.107	-2.313	-0.3734	0.0671	-5.5665	-0.2891	0.041	-7.0615
D(USA(-2))	0.021	0.1055	0.199	0.1379	0.0662	2.084	0.0088	0.04	0.2169
Exogenous variable									
France	0.0228	0.0381	0.5988	0.0674	0.0239	2.823	0.0151	0.0146	1.035
Italy	-0.017	0.0224	-0.7581	-0.0012	0.0141	-0.0874	0.0025	0.0086	0.2925
UK	-0.0006	0.043	-0.0144	0.0008	0.0268	0.0286	0.017	0.0164	1.037
Error Correction term	-0.0023	0.0035	-0.6607	-0.0141	0.0022	-6.4975	-0.0066	0.0013	-4.951

Table – 17

Vector Error Correction Estimates for
All the Selected World Futures Indexes

	D(Brazil)	Std-Error	t-statistic	D(Mexico)	Std-Error	t-statistic	D(USA)	Std-Error	t-statistic
D(Brazil (-1))	-0.0158	0.0401	-0.3937	0.317	0.0259	12.2435	0.141	0.0154	9.1296
D(Brazil (-2))	-0.401	0.043	-0.0002	0.082	0.028	2.929	0.0449	0.017	2.6857
D(Mexico (-1))	0.0071	0.068	0.1039	-0.0532	0.0439	-1.213	-0.021	0.0262	-0.793
D(Mexico (-2))	-0.04	0.064	-0.6187	-0.0629	0.0416	-1.5124	-0.027	0.0248	-1.089
D(USA (-1))	-0.2662	0.1142	-2.3305	-0.4007	0.0737	-5.4349	-0.327	0.044	-7.4406
D(USA (-2))	0.01895	0.11	0.1722	0.1337	0.0711	1.8823	0.0203	0.0424	0.4782
D(France (-1))	-0.2413	0.1589	-1.5184	-0.0396	0.1026	-0.3861	0.133	0.0612	2.1741
D(France (-2))	-0.0872	0.1616	-0.5396	0.1729	0.1043	1.6574	0.0807	0.0622	1.2974
D(Italy (-1))	0.595	0.1493	3.9861	0.2508	0.0964	2.6024	0.1645	0.0575	2.8615
D(Italy (-2))	0.028	0.1513	0.185	0.0109	0.098	0.1115	0.0103	0.0582	0.1766
D(UK (-1))	-0.2141	0.1661	-1.2893	-0.209	0.1072	-1.9493	-0.175	0.064	-2.743
D(UK(-2))	-0.1552	0.165	0.941	-0.099	0.1065	-0.9281	-0.091	0.0635	-1.427
D(Korea (-1))	-0.018	0.0544	-0.331	0.0478	0.0351	1.3619	0.0586	0.0209	2.802
D(Korea (-2))	-0.05	0.055	-0.907	-0.0756	0.0353	-2.1446	-0.048	0.021	-2.2996
D(India (-1))	0.0242	0.041	0.5869	0.0039	0.0266	0.1464	-0.018	0.016	-1.1076
D(India (-2))	0.0186	0.041	0.454	0.0233	0.0264	0.884	0.034	0.0157	2.188
D(Singapore (-1))	0.0526	0.0836	0.6297	0.2182	0.054	4.045	0.1397	0.0322	4.3403
D(Singapore (-2))	0.0664	0.0848	0.7837	0.0938	0.0547	1.715	0.1058	0.0326	3.2405
Error correction term	-0.0045	0.0031	-1.4454	0.0032	0.002	1.586	-0.001	0.0012	-1.102

Table – 17 (Contd.)

Vector Error Correction Estimates for All the Selected World Futures Indexes

	D(France)	Std-Error	t-statistic	D(Italy)	Std-Error	t-statistic	D(UK)	Std-Error	t-statistic
D(Brazil (-1))	0.1583	0.0214	7.4013	0.128	0.179	7.144	0.1307	0.018	7.201
D(Brazil (-2))	0.0281	0.0231	1.214	0.0409	0.0194	2.112	0.0281	0.0196	1.433
D(Mexico (-1))	-0.0232	0.0363	-0.6412	-0.0186	0.0304	-0.614	-0.024	0.0307	-0.7642
D(Mexico (-2))	0.0336	0.0344	0.9779	0.0451	0.0288	1.5666	0.0367	0.029	1.261
D(USA (-1))	0.0053	0.0609	0.0863	-0.0017	0.051	-0.0331	0.0048	0.0517	0.093
D(USA (-2))	0.0592	0.0587	1.0087	0.0208	0.0492	0.4223	0.0538	0.0498	1.081
D(France (-1))	-0.2493	0.0848	-2.9413	0.0865	0.071	-1.2188	-0.216	0.0719	-3.003
D(France (-2))	-0.1592	0.0862	-1.8468	-0.0707	0.072	-0.9807	-0.091	0.0731	-1.2426
D(Italy (-1))	0.2815	0.0796	3.5363	0.1074	0.0667	1.6112	0.2422	0.0675	3.5878
D(Italy (-2))	-0.0261	0.0807	-0.3233	0.0485	0.065	-0.7174	0.0114	0.068	0.1667
D(UK (-1))	-0.346	0.089	-3.906	-0.268	0.0742	-3.614	-0.311	0.0751	-0.1443
D(UK(-2))	0.1119	0.088	1.272	0.0823	0.0737	1.118	0.0164	0.0746	0.2195
D(Korea (-1))	0.0807	0.029	2.782	0.0856	0.0243	3.5272	0.0627	0.0246	2.55
D(Korea (-2))	-0.0085	0.029	-0.2902	-0.0128	0.0244	-0.526	-0.032	0.0247	-1.282
D(India (-1))	-0.01222	0.02197	-0.5561	-0.1224	0.0184	-0.666	-0.001	0.019	-0.0733
D(India (-2))	0.0254	0.0218	1.167	0.0169	0.0183	0.9242	0.0282	0.0185	1.5267
D(Singapore (-1))	0.1011	0.045	2.268	0.0507	0.0373	1.359	0.125	0.038	3.307
D(Singapore (-2))	0.0281	0.045	0.621	-0.0139	0.03785	-0.3663	0.0159	0.038	0.4156
Error correction term	-0.0044	0.0017	-2.6159	-0.0079	0.0014	-5.655	-0.003	0.0014	-1.771

Table – 17 (Contd.)

Vector Error Correction Estimates for
All the Selected World Futures Indexes

	D(Korea)	Std-Error	t-statistic	D(India)	Std-Error	t-statistic	D(Singapore)	Std-Error	t-statistic
D(Brazil (-1))	0.2035	0.035	5.809	0.2231	0.042	5.31	0.1397	0.025	5.6593
D(Brazil (-2))	0.0269	0.0379	0.711	0.0059	0.0454	0.1304	0.0223	0.0267	0.836
D(Mexico (-1))	-0.0016	0.594	-0.0275	0.0397	0.0712	0.558	-0.179	0.042	-0.429
D(Mexico (-2))	0.024	0.056	0.4265	0.1556	0.0675	2.3065	0.0596	0.0397	1.503
D(USA (-1))	-0.0154	0.0998	-0.1545	-0.100	0.12	-0.837	0.067	-0.0703	0.9545
D(USA (-2))	0.0757	0.096	0.0788	-0.004	0.1153	-0.031	0.0226	0.068	0.0334
D(France (-1))	-0.0491	0.1388	-0.3537	0.123	0.166	0.739	-0.0032	0.098	-0.032
D(France (-2))	0.0792	0.1411	0.5612	-0.020	0.1693	-0.1206	-0.134	-0.099	1.3468
D(Italy (-1))	0.2749	0.1304	2.1087	0.3204	0.1564	2.0874	0.241	0.092	2.623
D(Italy (-2))	-0.0293	0.1321	0.2219	0.1533	0.1584	0.9674	0.0314	0.093	0.3369
D(UK (-1))	-0.1957	0.1451	-1.3489	-0.419	0.174	-2.408	-0.1629	0.1022	-1.5938
D(UK(-2))	0.1785	0.1441	1.2393	-0.173	0.1728	-0.9993	0.1126	0.1015	1.1086
D(Korea (-1))	-0.098	0.047	-2.065	0.0246	0.0569	0.4328	-0.0198	0.0335	-0.5911
D(Korea (-2))	-0.173	0.048	-3.626	-0.121	0.0572	-2.1188	-0.1272	0.0336	-3.7805
D(India (-1))	0.039	0.036	1.083	-0.120	0.0432	-2.7878	-0.0041	0.0254	-0.1609
D(India (-2))	0.0751	0.0357	2.102	-0.027	0.043	-0.634	0.0573	0.025	2.278
D(Singapore (-1))	-0.1637	0.073	-2.2436	-0.059	0.0875	-0.6715	-0.1685	0.0514	3.2762
D(Singapore (-2))	0.0202	0.074	0.273	-0.01	0.084	-0.1134	0.0183	0.052	0.035
Error correction term	-0.0029	0.0027	-1.069	-0.007	0.0033	2.2239	-0.002	0.0019	-1.03

Fig 1. Generalized Impulse Response of Futures Indexes of Brazil, Mexico and USA

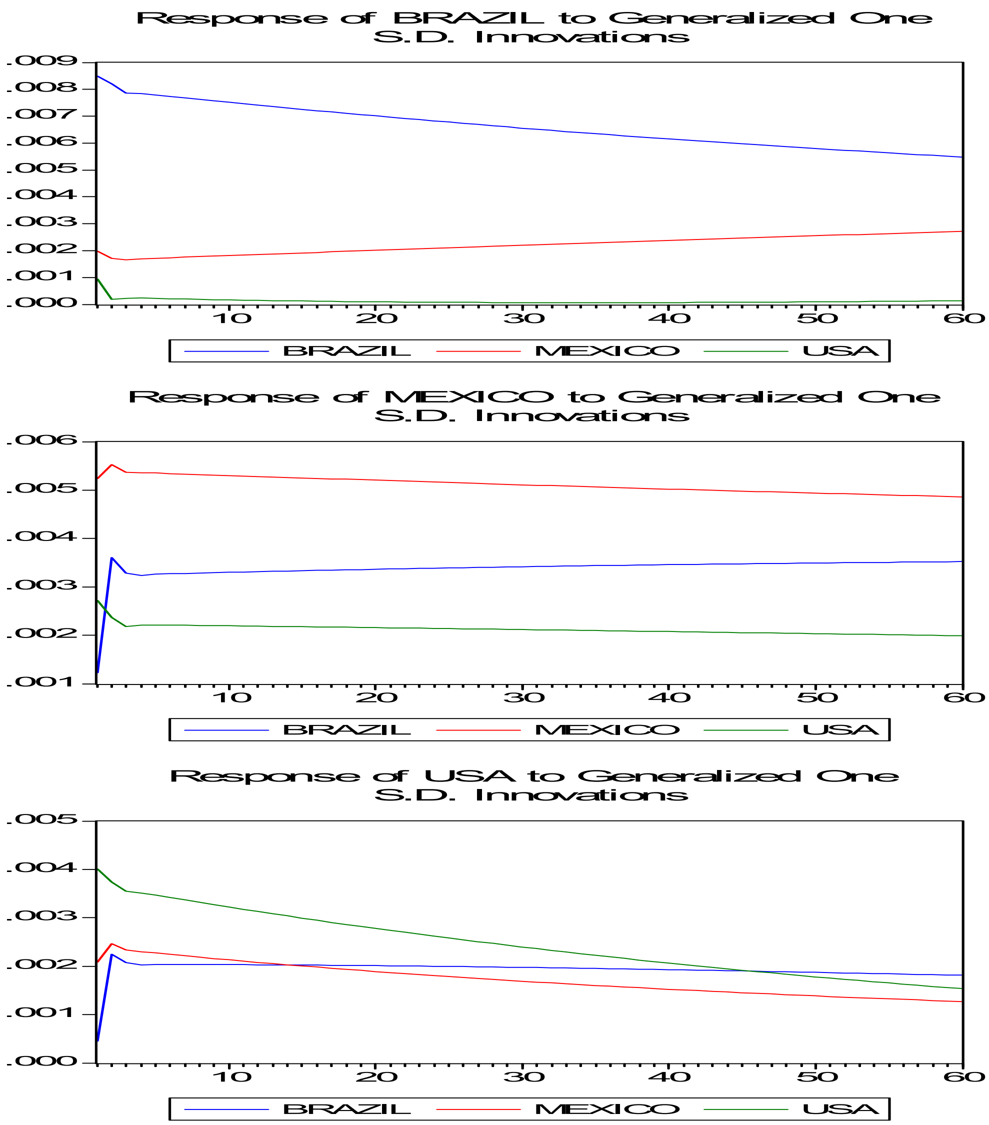

Fig 2. Generalized Impulse Response of Futures Indexes of France, Italy and UK

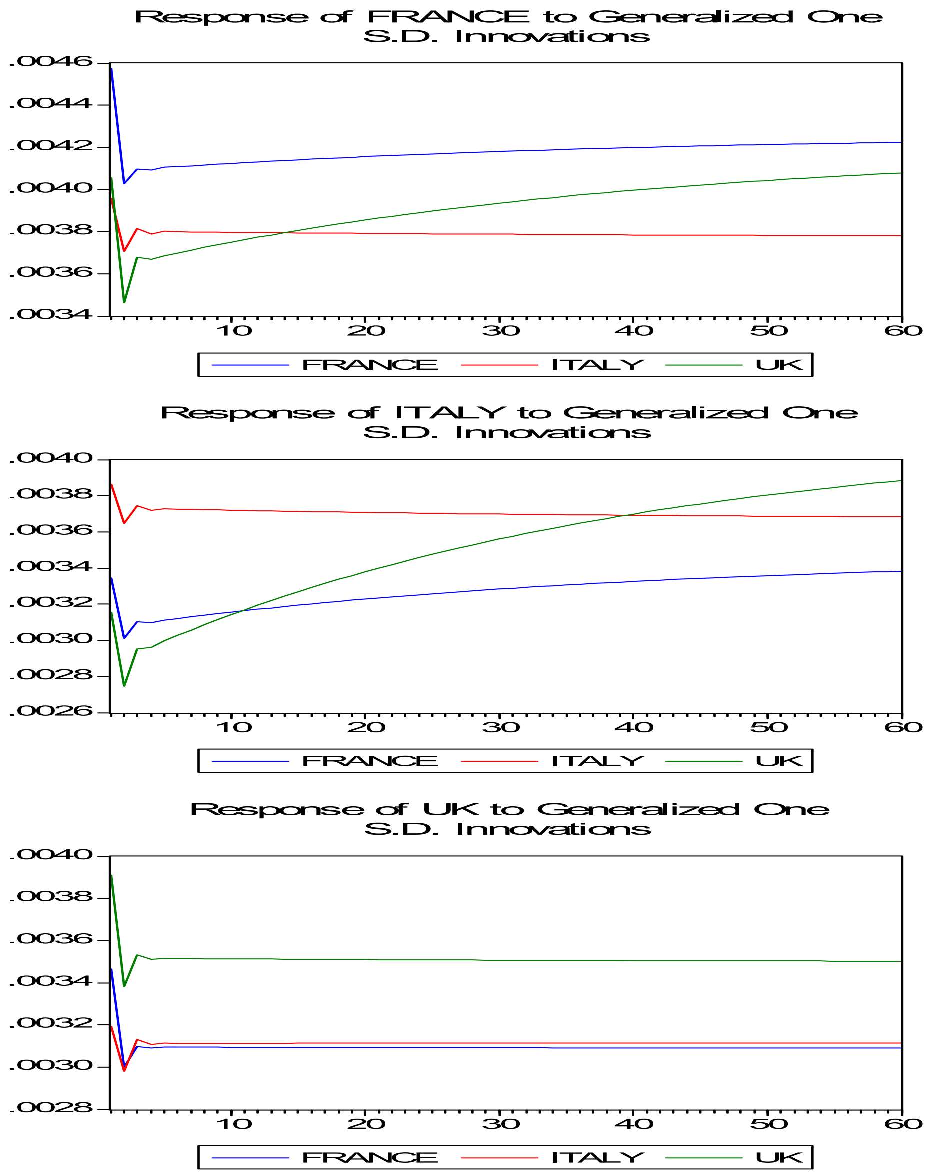

Fig 3. Generalized Impulse Response of Futures Indexes of Korea, India and Singapore

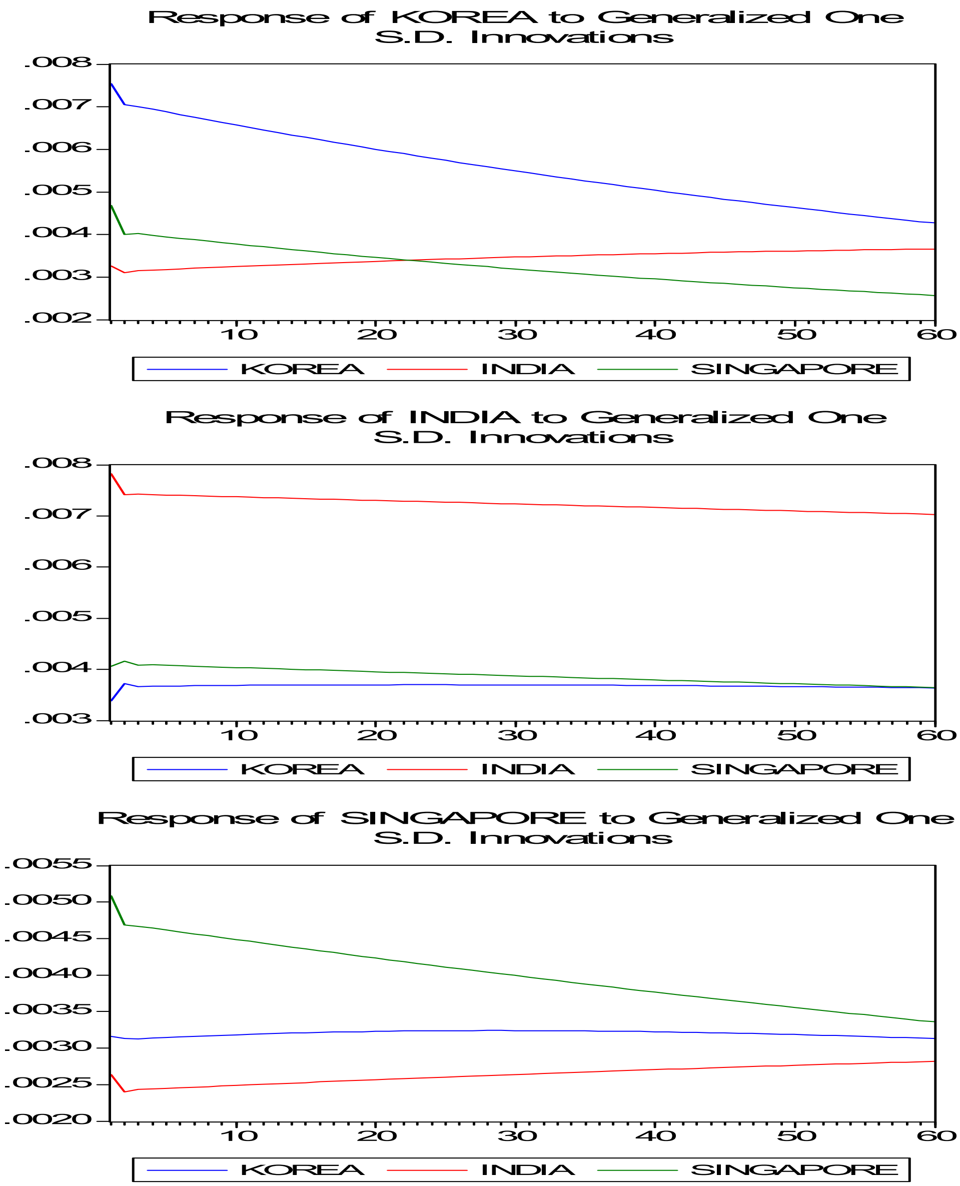

Fig 4. Generalized Impulse Response of Futures Indexes of Brazil, Mexico, USA, France, Italy and UK

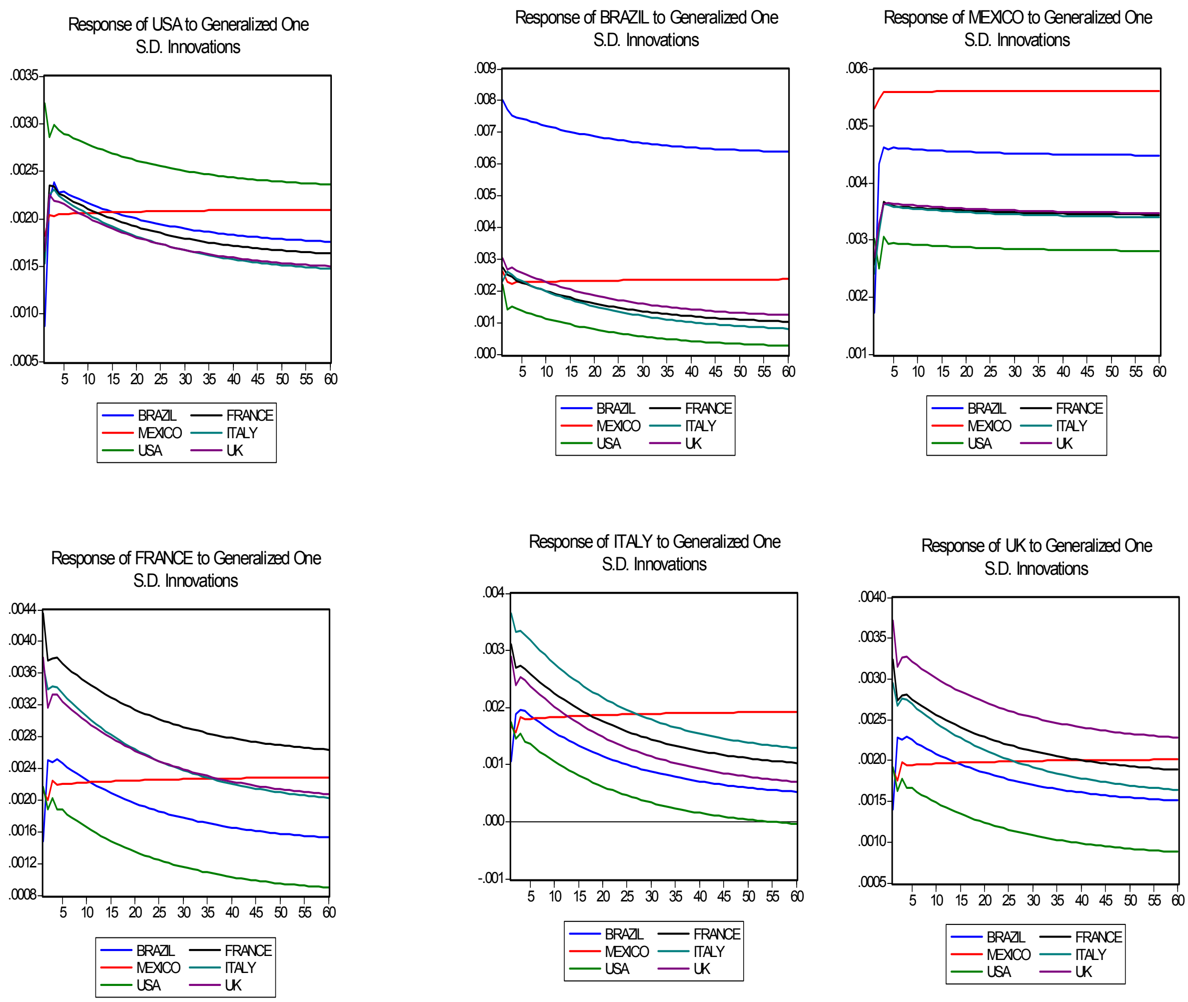

Fig 5. Generalized Impulse Response of Futures Indexes of Brazil, Mexico, USA, Korea, India and Singapore

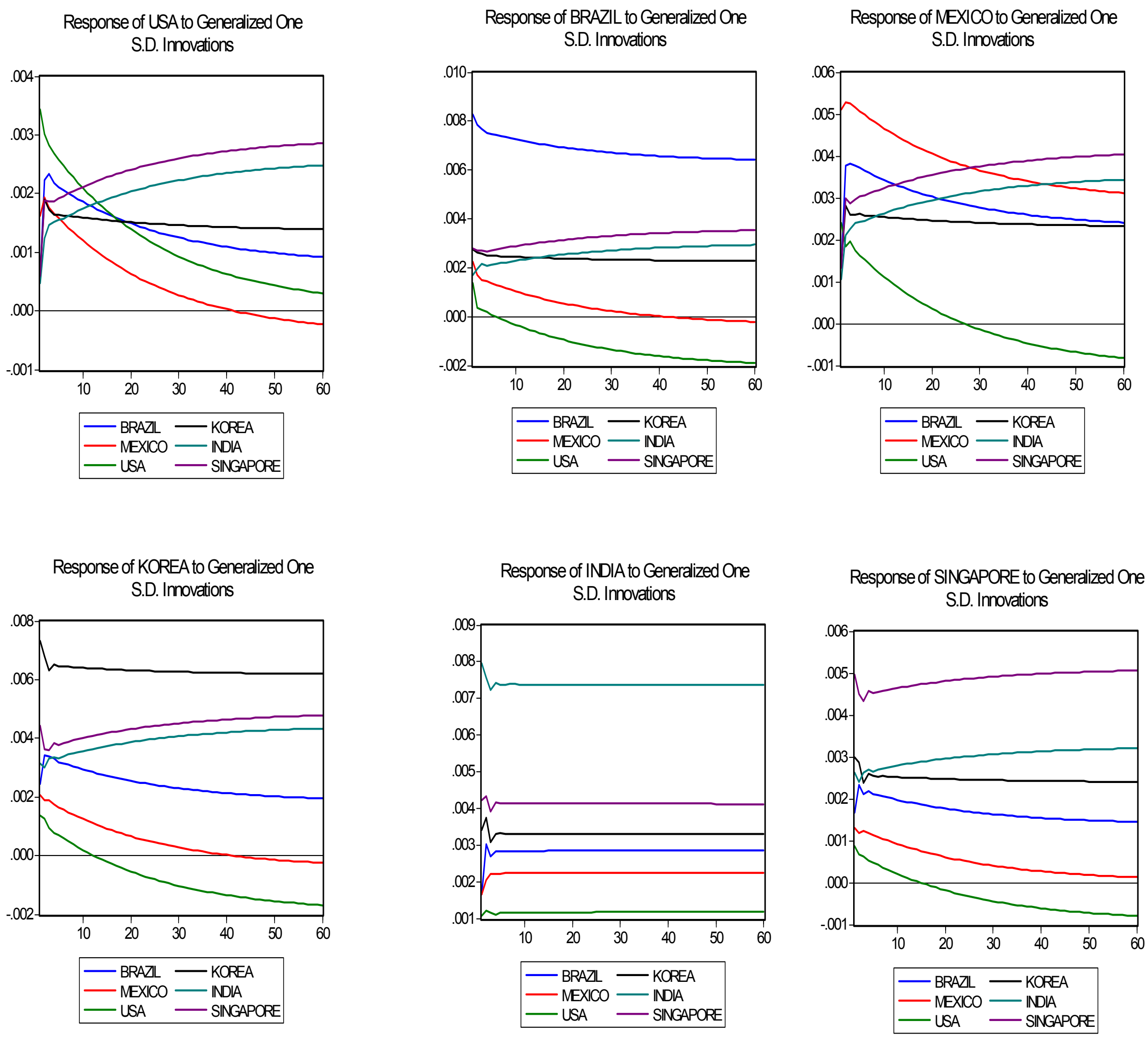

Fig 6. Generalized Impulse Response of Futures Indexes of France, Italy, UK, Korea, India and Singapore

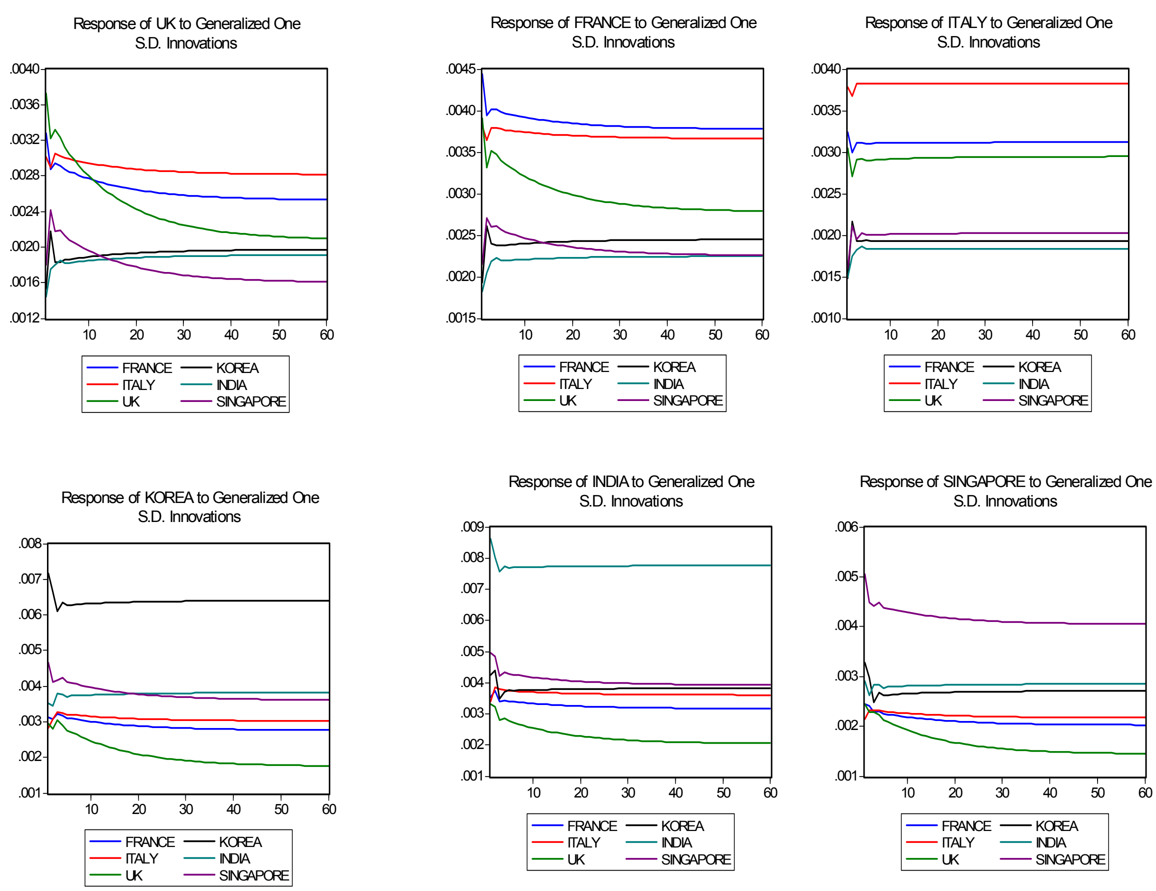

Fig 7. Generalized Impulse Response of Futures Indexes of Brazil, Mexico, USA, France, Italy, UK, Korea, India and Singapore