The Impact of Index Futures on Market Efficiency and Volatility of Spot Index: An Empirical Evidence from Emerging Economies (BRICS)

Jahanzaib Tarique

Scholar, IQRA University, Islamabad Campus, Pakistan,

jahanzaibtarique@iqraisb.edu.pk/Jahanzaibtarique22@gmail.com

&

Dr. Imran Riaz Malik

Associate Professor of Finance, IQRA University, Islamabad Campus, Pakistan,

imran.malik@iqraisb.edu.pk

Abstract

The concern of the impact of introduction of futures markets on the spot market has gained attention of researchers in both developing and developed countries. In this vein, this study investigates the impact of introduction of index futures on the stability aspect of underlying spot markets in BRICS economies. Specifically, this study checks the impact of introduction of index futures on the spot markets' volatility and market efficiency by using the daily return data of spot index of emerging economies. The equal pre- and post-futures data is used for analysis. An AR (1) augmented GJR-GARCH approach with underling error distribution of GED is used to estimate the level of market efficiency and volatility in the underlying spot market. The findings of the study suggest presence of volatility in the spot market post introduction of index futures. On the other hand, the study presents the significant increment in market efficiency of indexes of BRICS except Nifty index of India. These results suggest that the relationship does exists between market efficiency and volatility (according to the seminal work of Ross 1980 and others), which may imply that markets will have to bear cost (in terms of increase in volatility) for potential gains (increase in the level of market efficiency) if they introduce parallel futures markets.

Keywords: Index futures, GJR-GARCH, GED, BRICS

Introduction

Stakeholders of the financial markets continue to debate on the introduction of futures markets and their role in influencing the stability patterns of the overall markets. Despite the continued efforts, no clear consensus has reached so far. From earlier studies, Cox (1976) points out that futures markets reflect the improvement of market efficiency after their introduction. He attributes this event to the lower transaction cost, which attracts more investors to the market. This results in spot prices to react to new information sets, and provide accurate information signals to the investors. The increase in market efficiency is considered to have stabilizing impact on the market. On the other hand, Ross

(1980) derives a direct relationship between market efficiency and volatility. He interprets that more information channels can result in volatile spot prices. When the spot prices become volatile, they generally tend to move away from their fundamental values. According to Shiller et al. (1984), noise trading can drive the prices away from their fundamental values. Black (1986) expresses that noise traders are the investors, who blindly focus on any information that they think would affect the value of the assets. Further to the concept of noise trading, De long et al. (1990) adds that new information release encourages noise traders to make their investment decisions, which might be based on noise/ rumors. Such investment decision causes the market fluctuation that takes price away from fundamental state in short time. This context suggests the critics of futures markets construct the argument that introduction and parallel functioning to futures markets destabilize the market. Their luring features attract the noise traders to the market, who destabilize the market. In the absence of arbitrageurs or market makers, this situation could worsen and cause inevitable destruction in the market.

The literature on presence of parallel index futures presents contradictory results. The academic debate provides contrary empirical evidences, which needs further investigation. Most of the studies are conducted in mature markets, while the literature on emerging markets is in its infancy stage. From recent literature on futures markets, Lean, McAleer and Wong (2015) conclude that risk takers prefer trading in futures markets over spot markets, while risk averse traders are indifferent among these two markets. There could be several reasons for increase in underlying spot market. One of which could be activities of noise traders. The increase in volatility post futures cannot necessarily be attributed to destabilization in the underlying market. As mentioned earlier, this study is another effort to check the influence of parallel index futures on spot markets of emerging economies (i.e., BRICS). The study of emerging markets is important due to following reasons. First off, there are few studies that check the impact of index futures in emerging markets (e.g., Bohl and Siklos etc.). Unlike the study of Bohl and Siklos (2008), this study makes use of data on BRICS[1] economies. The study of emerging markets would not only allow us to compare the results with developed economies but the individual based economies in different regions (Africa, Asia, Latin America and Europe). Second, due to the globalization of financial markets and worldwide economic reforms, emerging markets have grown to the level that they are attracting the attentions of investors from all over the world. Another reason could be potentially low correlation with developed markets as well. Low correlation is synonymous to low portfolio risk (Harvey, 1995), which attracts portfolio managers. Third, the BRICS represent biggest group of emerging economies globally. Wilson and Purushothaman (2006) predict that economic scale of BRICS will be larger than that of G6. Furthermore, in recent times, it is observed that inward FDI is 34%, while outward is 33% of overall stocks in BRICS' FDI stocks (World Investment Report, 2015).

It can be observed that derivative markets are more uncertain and volatile than cash markets and thus can be a source of volatility in underlying spot market. When the information affects the stock market then the market efficiency and volatility may increase simultaneously, which may destabilize the spot market. The introduction of index futures and its impact on underlying spot market in emerging countries is going concern in academic but no conclusion could be made about their stabilizing or destabilizing impact on the spot market. The research questions stemming from the problem statement

is as follows: what is the impact of trading in index futures on the market efficiency and volatility of spot market? Therefore, the objectives of this study are presented as follows. The study intends to investigate the change in volatility and market efficiency of underlying spot market post introduction of index futures.

This study is being conducted for emerging countries i.e., BRICS. The size and interval of data to support the finding has not been used before. However, the type of econometric methodology and way to implement the specific modified models that we are going to use in this study, has never been tested before.

The remainder of the paper is structured as follows: Section 2 presents the theoretical and empirical review of relevant literature. Section 3 presents the research design of this study. Section 4 extends results and discussion of the results, while section 5 concludes the study with policy implications.

Literature Review

Forecasting stock returns has remained an area of competing interest for the stakeholders of the field, yet it remained controversial for decades. Technical analysts attempt to predict stock returns through their lagged values. Previously, several researchers pointed out that stock returns are autocorrelated (e.g., Cutler et al. 1990, Koutmos 1997a). Different authors attribute differing reasons[2] for this behavior of stock returns. Few studies in the string of arguments point out that the stock returns are negatively auto-correlated. There could be several reasons for negative autocorrelation in stock returns. For instance, one of the reasons as pointed out by Roll (1984) is that bid ask spread causes first order negative autocorrelation in the stock returns. Some authors relate this correlation with volatility. For example, Jin (2017) supports the argument that stock returns are negatively correlated with volatility. Many studies presume that autocorrelation is constant, yet recent literature on this topic depict that stock returns follow time varying autocorrelation. Campbell, Grossman and Wang (1993) assert that daily stock returns are related to trading volume and that first order correlation is decreased by trading volume. Other studies[3] from developed and developing economies present macroeconomic fundamentals that are helpful in predicting the stock returns.

Contrary to the destabilization hypothesis, few studies are in favor of stabilizing effect of introduction of futures. For example, Antoniou, Koutmos and Pericli (2005) investigate presence of feedback trading strategies for pre- and post- index futures by using data from developed economies. They report that feedback traders exist in pre-futures period and index futures does not simulate in post-futures period. They further report that index futures attract rational investors more than noise traders. This helps in stabilizing the market.

One category of researchers believes that futures trading destabilize the financial market. This argument could be understood by following studies. Cox (1976) points out that low transaction costs and low leverage requirements attract noise traders to the futures trading, which increases the information channels to the market. Ross (1989) extends this argument by stating that new information channels enhance the volatility in the market. He derives direct link between market efficiency and volatility. Later on, De long et al. (1990) assert that noise trading can move the market value of stocks

away from their fundamental values. For short span of time, rational traders also follow the trend, which becomes reason for further departure of market prices from their fundamental values. This cause increase in volatility. This relationship was studied for its authenticity later by different researchers and contradicting results were obtained. For example, Antoniou and Holmes (1995), Antonio et al. (1998) and Bae, Kwon and Park (2004) confirm in his study that futures ultimately simultaneously increase the volatility and market efficiency of cash stocks. Contrarily, Debasish (2008) studied this relationship in SSFs in Indian Market. He reports that there was a simultaneous decrease in market efficiency and volatility. Hou and Li (2014) present similar results for Chinese index futures markets. Following these arguments, Malik and Khan (2012) and Malik and Shah (2017) employed different methodologies on different data sets on SSFs in the context of Pakistan. They report no change in market efficiency as well as volatility. Since these studies are conducted in index futures markets and SSFs, the difference in result can be attributed to the difference between the features of these two types of markets. Anotniou et al. (2005) assert that index futures enhance market efficiency and volatility simultaneous. However, this increase in volatility should not be considered as destabilizing because it makes the market more efficient. This helps the market in price adjustments in timely fashion. There are several other studies[4] that report that trading in equity derivatives does not destabilize the market.

Following are some of their work which examines the impact of futures on different dynamics. Gahlot and Datta, (2012) check the impact of single stock futures on spot market of BRICS by using GARCH in mean model. Debasesh (2009) study the impact of derivative trading in the stock market of India by using pre and post year data. The econometric methodology GARCH used to estimate the volatility. The findings suggest that there is no volatility impact of index futures in stock market. Malik & Shah (2017) examines the impact of SSFs on market efficiency and volatility. This study also investigates whether SSFs destabilize the spot market. The hypothesis of this study suggests that the reflection of information in spot market tends to increase the volatility. The sample period consists of pre and post two-year data of 22 SSFs and 23 non-SSFs stock listing in spot market with their respective introduction date. Equal pre and post for two years daily closing prices on each side are used to investigate the impact of SSF in underlying cash market. CAPM is used mean equation, while GJR-GARCH is used as variance equation. The results indicate that in respective stock market the introduction of SSFs did not increase the volatility and market efficiency of cash market. Hence, decided at least, there is no stabilization impact of SSFs. There are several studies[1] that are conducted in the context of Pakistan. Khan, Shah & Abbas (2011) studied the impact of Single Stock Futures on the return volatility of KSE. The study covers 9-year data, initiated from 1999 to June 30, 2008 by using GJR-GARCH approach to check the unconditional volatility of stocks. The empirical evidence presents mix findings for SSF listing stocks in cash market. However, results show the inducements of SSFs not change the return volatility. Awan & Rafique (2013) examined the impact of SSFs in cash market and investigates the structure and volatility containing 24 companies listed in Karachi Stock Exchange. This study shows variance by testing F test and GRACH model is used to estimate the time based volatility of stock exchange. This study contradicts the previous study of Khan, Shah and Abbas (2011) that volatility occurs but structural changings are also observed.

[1] [1] Malik, Shah and Khan (2019; 2013, 2012) and Malik and Shah (2017, 2016; 2014).

In 2007, the futures contracts were introduce based upon the listed real estate market in Europe. After the launching of futures in European market has received attention from property investors. Lee, Stevenson & Lee (2012) examine the impact of derivative market on spot market volatility and market efficiency. This study concern whether SSFs stabilize the spot market with respect to volatility and market efficiency. To investigate the impact, the data sample comprised 2004 to 2010. this study used GARCH and M-GARCH models for European real estate securities market. Similar with previous studies, this study also depicts the introduction of SSFs did not destabilize the underlying listed market. Numerous studies have been conducted to check the effect of futures respectively. This study contributes the impact of futures on Taiwan stock market. This study contributes the stabilization impact of futures trading in Taiwan Stock Exchange (TSE). The stabilization impact of index futures involves the study cash market volatility behavior. Whether derivative contracts sustain the information transmission tendency in spot market, the volatility decline in spot market. The sample period consists of 5 years daily prices taken from Taiwan Economic Journal (TEJ) database. (Garman & Klass) adopted daily volatility measures in this paper and GJR model is used to measure the volatility in spot prices. This study suggests alter in volatility pattern TAIEX derivatives while MSCI stocks shows has no destabilization impact after the introduction on spot price fluctuation (Chiang & Wang, 2002).

As we observed more and more studies that has been conducted, directly based on the disability impact of futures on spot market however, according to (Bohl & Wilfling, 2010) this study tends to filter the hypothesis that stability and disability impact of futures more accurately than previous studies. The data period comprises from 1997 to 2007 covers 10 year. This paper uses the GARCH model to check the volatility behavior of futures trading developed in (Gray, 1996). This study supports the argument that the futures trading is not considered volatility factor in Poland stock market

Alexakis (2011) examines the stabilization and stabilization impact of derivative trading in equity market. This research highlights the impact on absolute angles, weather futures creates changings, increase(decrease) in volatility or any of positive or negative impact on cash market. This study makes use the data from 1997 to 2004 by using GJR-GARCH and GARCH model to estimate volatility but findings shows no significant relationship of futures and spot market index

Indian capital and futures markets contribute the extensive literature in derivative innovation. However, this study once again primarily studied based on weather Indian market shows any significant volatility after the futures introduction. This investigation has been undertaken with a comprehensive sample data of daily prices beginning from 1996 to 2007. This study concludes that the introduction of derivative trading has reduced the marginal volatility and less reduction in spot market volatility after their introduction (Deo & Saravanan, 2008).

In Turkish context, (Kasman & Kasman, 2007) considers the impact of futures is Istanbul market by using the daily closing price of stock market starting from July 01, 2002 to October 8, 2007. The E-GARCH model used to support the finding whether the introduction of futures plays a vital role in stability of Istanbul spot market. Hence, no volatility impact is observed after the introduction of futures. These results are consistent with the earlier findings that SSFs did not destabilize the

underlying spot market. As we observed different researcher conclude mixed results by using different tools, sample period and other factors. The debate regarding introduction of futures trading alongside spot market is the interesting area and going concern in literature because it supports the investment decisions based on the market information and fluctuation in prices. Few studies are conducted to investigate the impact of index futures on market efficiency and volatility of stock market especially in emerging countries.

Given the continual developments in the debate on the impact of introduction of different forms of derivatives in the market across the globe, there is a need of further evidences that can help conclude this idea. This study also intends to explore the related issue in the context of BRICS countries by using advance econometric methodologies and different data set with the introduction of futures in each country. This study provides the another way to look the volatility and market efficiency effect of futures in emerging countries in the presence of feedback traders that are involve with the deviation of prices from their fundamental values along with enough liquidity. This study is an attempt to provide another evidence from the perspective of emerging markets.

Data and Methodology

This section presents data and econometric methodology that is employed to find out the results.

Data Description

This study mainly considers indices for each country of BRICS to show stock index of each country separately. The daily closing prices of cash market is taken from yahoo finance and respective website of BRICS. To check the volatility in returns and market efficiency for each country the whole sample is divided into main two section: (pre-futures and post-futures data). Table 1 presents the description of the data period respectively.

Table 1: Listing Dates of Futures Indices in BRICs

Country (underlying index)	Pre-data period	Introduction date of index futures	Post-data period	Whole period
Brazil (IBrX-50)	October 17, 1998 to October, 16 2003	October 17, 2003	October 17, 2003 to October 16, 2008	October 17, 1998 to October, 16 2008
Russia (RTSI)	August 03, 1995 to August 02, 2005	August 03, 2005	August 03, 2005 to August 02, 2015	August 03, 1995 to August 02, 2015
India (S&P CNX Nifty)	June 12, 1994 to June 11, 2000	June 12, 2000	June 12, 2000 to June 11, 2006	June 12, 1994 to June 11, 2006

China (CSI300)	April, 16 2005 to April 15 2010	April, 16 2010	April, 16 2010 to April, 15 2015	April, 16 2005 to April, 15 2015

Methodology

This section explains the detail about the tools, techniques and measures that are used for data analysis. In prior studies different tools are used to measure the market efficiency and spot market volatility of underlying stocks. This study encompasses the relationship between volatility and operational efficiency. Famous AR (1) augmented GJR-GARCH model is used to check the level of market efficiency and volatility on underlying stock.

Estimation of Volatility and Market efficiency

This study use following approach[2] to measure the change in volatility and market efficiency. This model is constructed for pre and post period for each stock separately. To generate residual term, AR (1) model is used as mean equation as follows:

$$R_{m,t} = \propto_{\mathrm{i}} + \ \beta_{\mathrm{i,t}} R_{m,t-1} + \ \varepsilon_{\mathrm{i,t}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.2.1.1$$

Here $R_{m,t}$ is used to the market return.$\propto$ is the constant term. $\beta_{i,t}$ Which appears provides excess market return $R_{m,t}$ over RFR. The company specific risk is measured by $R_{f,t}$. For each coefficient, the associated p-values are used to interpret the statistical significant variables. The mean equation (3.2.1.1) is estimated for each stock and required coefficients and their respective t-statistics are obtained.

The destabilization hypothesis suggests that the single stock futures increase the market efficiency and volatility of underlying stock market. For this purpose, (Glisten, Jagannathan & Runkle, 1993) proposed asymmetric GJR-GARCH model to check that if any observed changes in variation of prediction error are permanent. On the another hand, to diagnose stability/disability futures impact on common market is to check weather futures accelerate the speed at which new information is subsume in the stocks market while comparing from pre- to post-SSFs trading period. (Malik and Shah) proposed the model to check the impact of single stock futures on volatility of stock and information incorporated coefficient $\delta_{\mathrm{i},1}$ is measured by estimating the following equation for pre and post SSFs separately for each stock.

$$\sigma^2{}_{\mathrm{i,t}} \ = \ \varphi_{\mathrm{i,t}} + \ \delta_{\mathrm{i},1}\varepsilon^2{}_{\mathrm{i,t-1}} + \ \lambda_{\mathrm{i},1}\sigma^2{}_{\mathrm{i,t-1}} + \ \partial_{\mathrm{i},1}\varepsilon^2{}_{\mathrm{i,t-1}}\, \mathrm{I}_{\mathrm{t-1}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.2.1.2$$

For, unconditional variance the statistically significant is estimated the p-value of $\varphi_{\mathrm{i,t}}$. the market efficiency for each pre and post year stock is present by $\delta_{\mathrm{i},1}$ and conditional variance $\lambda_{\mathrm{i},1}$ is the conditional variance from the past period, and $\partial_{\mathrm{i},1}$ depicts effect of asymmetric news ($\partial_{\mathrm{i},1}$ is dummy variable $\mathrm{I}_{\mathrm{t-1}}$ takes the value of zero $\varepsilon_{\mathrm{i,t}}$ if is negative and the value of one otherwise). If the introduction of SSFs decreases the volatility in the underlying stocks, the variation in the error term

[2] Used by several other studies (e.g., Malik and Shah 2019, Mazouz and Bowe 2006 etc.)

$\varepsilon_{i,t}$ will decrease subsequent to SSFs listing. Market efficiency increases (decreases) with increase and (decreases) in $\delta_{i,1}$ in following stocks, shows the positive rate of information interact in the stock prices. Likewise, the increase (decrease) in unconditional volatility depicts $\varphi_{i,t}$.

Results and Discussion

Tables 2 and 3 present preliminary statistical measurements. Jarque-Berra (JB) test is used to check the normality of each episode of stock returns. Similar descriptive statistics are calculated for developed countries, the results of descriptive statistics for BRICS are given bellow:

Table 2: Descriptive Statistics for Pre-Futures Stock Indices

Stocks	Mean	Median	Minimum	Maximum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
IBRX_50	0.00	0.00	-0.12	0.05	0.01	-2.82	63.90185	277000.00	0.00
RTSI	0.000361	0.00	-0.09	0.07	0.012716	-0.35	8.455449	3120.00	0.00
NIFTY_50	0.00	0.00	0.04	0.04	0.01	0.12	5.97	423.00	0.00
CSI300	0.000442	0.00	-0.04	0.04	0.009336	-0.43	5.186582	280.00	0.00
JSE40	0.000203	0.00	-0.04	0.027745	0.01	-0.28	6.84	316.6831	0.00

Note: Table 2 presents preliminary statistical measurements. Jarque-Berra (JB) test is also used to check the normality of each episode of stock returns.

Table 3: Descriptive Statistics for Post-futures Stock Indices

Stocks	Mean	Median	Minimum	Maximum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
IBRX_50	0.00	0.000000	-0.04	0.055963	0.01	0.487540	8.35	1410.00	0.00
RTSI	0.00	0.000426	-0.09	0.087745	0.009986	-0.42	13.91235	12400.00	0.00
NIFTY_50	0.00	0.000680	-0.06	0.03	0.006283	-0.97	9.99	3300.00	0.00
CSI300	9.78E-05	3.84E-05	-0.03	0.021390	0.01	-0.24	5.485078	323.00	0.00
JSE40	0.00	0.00	-0.02	0.02	0.005476	0.144133	3.31	3.672790	0.00

Note: Table 2 presents preliminary statistical measurements. Jarque-Berra (JB) test is also used to check the normality of each episode of stock returns.

Table 4: Maximum Likelihood estimates for CAPM-GJR for Stock Indices:

S. No.	Index	Period	$\propto_i$	Prob.	$\beta_{i,t}$	Prob.	$\varphi_{i,t}$	Prob.	$\delta_{i,1}$	Prob.	$\lambda_{i,1}$	Prob.	$\partial_{i,1}$	Prob.
1	**IBRX_50**	**pre**	49.30	0.00	48.10	0.00	0.00	0.11	0.09	0.20	0.57	0.13	(0.10)	0.19
		post	30.40	0.00	30.00	0.00	0.00	0.01	0.11	0.01	0.58	0.00	(0.11)	0.01
2	**RTSI**	**pre**	169.00	0.00	159.00	0.00	0.00	0.00	0.26	0.00	0.79	0.00	-0.10	0.01
		post	125.00	0.00	119.00	0.00	0.00	0.00	0.16	0.00	0.89	0.00	-0.12	0.00
3	**NIFTY_50**	**pre**	21.40	0.00	21.10	0.00	0.00	0.01	0.12	0.00	0.83	0.00	-0.07	0.08
		post	674.00	0.00	466.00	0.00	0.00	0.00	0.00	0.89	0.68	0.00	0.32	0.00
4	**CSI300**	**pre**	21.20	0.00	20.90	0.00	0.00	0.06	0.06	0.00	0.93	0.00	0.02	0.38
		post	0.27	0.00	0.27	0.61	0.00	0.04	0.03	0.01	0.95	0.00	(0.01)	0.53
5	**JSE40**	**pre**	28.90	0.00	27.50	0.00	0.00	0.07	0.05	0.04	0.83	0.00	0.16	0.01
		post	0.00	0.00	0.00	0.98	0.00	0.00	(0.05)	0.00	1.01	0.00	0.06	0.00

Table 4 shows the results obtained by applying equation 3.2.1.1 and 3.2.1.2 that report mean and variance equation for each index of BRICS for pre- and post-period. For the per period all stocks (i.e., IBRX, RTSI, NIFTY, CSI300 JSE40) shows positive volatility at 5% level of significance. For market efficiency except IBRX, RTSI, NIFTY, and CSI300 and JSE40 show positive market efficiency at same level of significance. Similarly, for post period all stocks IBRX, RTSI, NIFTY, CSI300 and JSE40 shows positive volatility at 5% level of significance. Expect NIFTY all stocks show positive volatility.

Furthermore, the volatility coefficient ($\varphi_{i,t}$) depicts the pre and post period results of BRICS countries. In fact, the study based on the comparison of pre and post volatility of underlying stock market. The p-value of ($\varphi_{i,t}$) determines the change in volatility, however mix results are obtained for each stock index in per and post period. For IBRX, in pre period volatility coefficient is statistically insignificant that means there is no volatility found in pre period. In contrast, the volatility is found by results and conclude that after the introduction index futures in stock market the volatility is found.

For, RTSI, same results are observed for pre and post period the same results are obtained. The p-value of ($\varphi_{i,t}$) is statistically significant presents that the volatility is observed in both period. These results suggest there is no impact of index future in Russian underlying stock market. Furthermore, for NIFTY p-value for pre period (0.0074) and post period (0.0000) is statistically significant suggest that the NIFTY are volatile both in pre and post period. However derivative tools did not affect the underlying stock market nor destabilize after the introduction. Similarly, for CSI300, in pre period the statistical figures (0.0572) show no volatility in underlying stock market but after the introduction of index futures in underlying stock market volatility is found through results. Finally, the top 40 stocks of JSE shows similar results as Chines volatility results that the volatility is not found in pre period but after the introduction of index futures the volatility is found. However, the volatility in stock market is found after the introduction of index futures in the stock market of Brazil, China and South Africa. While the volatility is found in pre and post period of Russian and Indian stock market also suggest no impact of index futures in underlying stock market.

Apart of volatility, literature suggest that index futures simultaneously increase the market efficiency of underlying stock market. However, the coefficient of market efficiency ($\delta_{i,1}$) suggest whether the market efficiency increase or not after the derivative enter in common market as a risk-free investment tool. Same like volatility results, the statistical results are also mix with the patter of time frame. Firstly, in pre period market efficiency was not found in Brazilian stock market but later on the market efficiency is found after the introduction of futures. The results show that index futures effect the market efficiency of underlying stocks. While in Russian market efficiency is found in both pre and post period.

Similarly, the p-value of market efficiency coefficient in NIFTY index (0.0007) is significant suggest that the Indian stock market was efficient before the introduction of index future. On the other hand, the p-value (0.8943) shows the insignificant results in post period. Furthermore, in chines and South African stock market the market efficiency is already found in pre and post period similar with the results of Russian stock market concludes the index future neither increase nor decrease the market efficiency of underlying stock market. On the other hand, the Brazilian and Indian stock market presents indifferent results regarding market efficiency.

***Table* 5: Results for Volatility: AR (1) augmented GJR-GARCH Approach**

Number of stocks with 5% level of significance (Pre period)	3(2)
Number of stocks with 5% level of significance (Post period)	5(0)
5% significantly positive (negative) (Pre period)	5(0)
5% significantly positive (negative) (Post period)	4(1)

Table 5 presents the volatility coefficient ($\varphi_{i,t}$) of stocks. The results explain out of (5) stocks (3) stock indexes are statistically significant in pre period. While in post period, all indexes are statistically significant with 5% level of significance. Similarly, all indexes are positively significant with 5% level of significance in pre period. While only one stock index is negatively significant with same level of significance.

***Table* 6: Results for Market Efficiency: AR (1) augmented GJR-GARCH Approach**

Number of stocks with 5% level of significance (Pre period)	4(1)
Number of stocks with 5% level of significance (Post period)	4(1)
5% significantly positive (negative) (Pre period)	5(0)
5% significantly positive (negative) (Post period)	4(1)

Table 6 presents the results of market efficiency coefficient ($\delta_{i,1}$). In per period out of (5) only (0) stock index is insignificant at 5% level of significant. Similar results are obtained for post period. On the other hand, all stock indexes are positively significant at 5% level of significant. While, (4) stock indexes are positively significant and (1) is negatively significant at same level of significance.

Several other studies have been conducted to check the volatility and market efficiency directly by using different modes to conclude results, weather the index futures stabilize or destabilize the spot Index. The index futures either increase the volatility and market efficiency or stabilize the stock index. Three aspects are necessary to elaborate while concluding results: index futures are increase/decrease or no change in volatility and Market efficiency. With respect to BRIC as emerging zone (Gahlot and Datta, 2012) approach to summarize the results. The empirical evidence suggests that Russian stock market became efficient after the introduction of futures. In contrast (Debasish, 2009) argue that Indian stock market became more volatile and inefficient after the introduction of futures trading in Indian market. The results are also augmented with results of Ang and Cheng (2004), who confirm in his report the market efficiency is improved after derivatives in One Chicago and NQLX and decline in volatility post-SSFs. The results of (Kasman and Kasman, 2008) are consistent with (Gahlot and Datta, 2012). Worth (2010) suggest that the information flow after futures entrance is speed up and market

became more efficient. Regarding volatility, (Hasan, Chowdhary and Snabyashachi, 2011, Milovanova, 2013). Suggest that futures are wholly or partially responsible with the stock volatility. In contrast, (Khan, Shah and Abbas, 2011, Spyrous, 2005 and Ghullen and Mayhew, 2000) argue that there is no change in the volatility of cash market. In this study, combination of results is obtained and present mixture of results because different tools, methodologies and sample techniques are being used to conclude results. These results are consistent with the mix results found by Lien and Zhang (2008) while surveying in emerging indices. (Lee, Sion and Lee, 2012) suggest that in European region, no destabilization impact is found. The results of Gahlot and Datta (2012) are consistent with the results of this study. They argue that the market efficiency increases while the volatility of NIFTY reduced but this study suggest the volatility is found both pre and post period. These results differ on the basis of different methodology Gahlot, who use ACF and Run test to estimate the volatility. On the other hand, this study use GARCH model to summarize the results. Furthermore, Bae, Kwon and Park, (2004) investigated the volatility and market efficiency of KOSPI200 and summarize that index futures destabilize the cash market. However, this study is also similar in results, the volatility of IBRX and CSI300 stocks increase and market efficiency is increased after the introduction except NIFTY. These results are similar with the results of (Bae at al, 2004).

Khan, Shah and Abbas (2011) argue that there is no change in volatility but this study suggests that the stock of CSI300 and JSE 40 became more volatile. Empirical evidence shows both studies used same methodology to depict results but different set of data or any industrial movement may change the findings. McKenzie et al, (2001) report decline unconditional volatility due to the introduction of non-cash financial instrument on spot market but this study argues that there is no impact of futures on the volatility of BRICS. Another study of Malik and Shah (2016) argue that that stringent regulations are unjustified, which may reduce the liquidity and efficiency of the market and do no good to the market. In this study NIFTY stocks are consistent with fallowing investigation. In contrast this study present that there is ultimate increase in volatility after the introduction while the study of Malik and Shah (2012) and Malik (2013 suggest the decrease systematic risk. Same approach is used in both studies but Malik and Shah (2013) used single stock futures and compare with non-single stock futures. The data set is different by summarizing robust results. The contradictory results might be possible while investigating particular variable. Regarding this study, the results deviate due to different factors: methodology, sample size, sample period or any other industrial variations.[3]

Conclusion

The derivative trading in stock market serves as a risk free financial tool that may help to stabilize the cash market. After the introduction of parallel futures market, extensive debate spur on whether index futures stabilize or destabilize the cash market. The destabilization hypothesis explains the simultaneously increase in volatility and market efficiency of stock market. It is obvious while investing in this new financial environment that investors wish to know the impact and future possibilities that are connected with it. They can perceive the true value of such securities form different perspectives that how it is better and affect the spot market. Only one study elaborates the impact in the case of BRICs and no existing study is providing the complete group of nations as

[3] A

BRICS. This study is the first one to highlight the going concern of index futures in the context of volatility and market efficiency by using equal pre- and post- data for all five countries and advance econometric methodology for robustness of results. This study is concern with the comparison of pre and post data and highlights the significant change in volatility and market efficiency. The empirical results show the mixed results for each index. The results show that there is a significant change in volatility of underlying stocks of BRICS indices while comparing pre and post period data set.

Similarly, the index futures increase the market efficiency and the flow of information that reflect the stock market. The empirical results show that market efficiency is increased in BRICS spot index except NIFTY stocks consistent with the study of (Gahlot and Datta, 2012) and opposite with the study of (Malik and Shah, 2016). In nutshell after the inspection of pre and post comparison study shows that the spot volatility and market efficiency is increased. The destabilization impact of futures trading is found thorough this study.

Practical Implications

The results of this study suggest important implications for investors, policy makers, decision makers, practitioners, researchers and regulatory bodies of BRICS. The emerging countries are more attractive market for international as well as domestic investors. Due to the inefficiencies of cash markets the investors are not able to find the risk free way of investment. This study will help the investors and they will be able to know the future trends, returns and volatility of spot market and can take appropriate decisions according to the direction and variation of stocks. Risk averse investors adjust their portfolio by showing interest towards futures markets. This study also highlights the standards and action to be taken for stabilization of cash market. When the volatility increases in market which in turn, tends to great uncertainty, high deviation of prices, less liquidity, market inefficiencies and higher rate of return is observed in previous studies. For making short term profit, speculators and arbitrageurs are attracted towards stock market. Regarding futures, better knowledge about the progress, profits and volatility dynamics help to minimize, manage risk and budget-planning decisions. The regulators and policy makers will be able to understand the anomalies existing in stock market. Findings are important to regulators for reviewing the contract specification (i.e., contract size, contract period, starting and ending dates, overlapping period) and trading mechanism could lead to enhancement of derivative as better risk management tool. Hence, a best market policy for derivative trading would be uplift market stabilization still not effecting market efficiency in stock market.

In emerging markets, the constructive development of futures contracts has to be encouraged by sound macroeconomics updated policies need to be supported. There is no uniform optimal development procedure to stabilize or sequence the stock markets; gradual important amendments for dynamic in different stock markets are encouraged.

Suggestions for Future Research

The following pattern regarding futures provides an outlook from different dimensions to check the stabilization or destabilization impact of derivative market in underlying stock market. This study also suggests to use the different time interval to check the concerning impact. There is need to be construct

different theoretical framework by using different methodologies to conclude the indices of BRICS. It is imperative to state that composite index data might not be a good proxy. Respective individual stock prices or sector indexes might have a more generalized result. This important point can be discussed in future research, while collecting the data on SSFs. This study primarily focused on the pre and post time series regarding the establishment of index futures. Furthermore, the future studies related derivative tools need to be encouraged in BRICS zone. This study highly recommended the study of comparison between developing and developed exchanges by including more indices. This will help to regulators to understand what steps need to be taken for the stabilization of markets as mature markets. The in-depth comparison will be useful to understand the macroeconomic variables which in turns, associated with the destabilization of underlying stock market.

Endnotes

[1] BRICS stands for Brazil, Russia, India, China and South Africa

[2] There are some other reasons for autocorrelation patterns as well. For example, Lo and Mackinlay, 1990; Scholes and Williams, 1977 attribute this behavior to microstructure bias (overlooking "nonsynchronous trading). On the other hand, there are few studies that risk as the main reason of such type of autocorrelations. For example, Conrad and Kaul, 1988; Fama and French, 1988 anticipate temporal varying risk premium in the short run as the primary reason for this type of autocorrelation.

[3] Buncic and Moretto, 2015; Bekiros, Gupta and Kyei, 2016; Chiang and Chen, 2016; Gupta et al., 2016; Shang et al., 2016; Sousa et al., 2016; Cai et al., 2017).

[4]Baldauf and Santoni (1991), Becketti et al. (1997), Schwert (1990), Fortenbery and Zapata (1997), Jochum and Kodres (1998) and Nets (1995).

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