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IMPACT OF GLOBAL FINANCIAL CRISIS ON JAPAN, CHINA, INDIA AND USA STOCK EXCHANGE AND INTER-LINKAGE BETWEEN THEM

Khakan Najaf [1], Rabia Najaf [2]
[1, 2] Department of Accounting & Finance, University of Lahore, Islamabad Campus, PAKISTAN

ABSTRACT

The prime objective of this study is to analysis the global financial crisis on the stock returns of USA, India, China and Japan with the help of E-GARCH model. After applied the granger causality we have found the volatility spillover among different stock indices. For this purpose we have taken the daily stock prices from 7th of feb, 2007 to 23nd may 2012.our main finding is as fellow. First, in the circumstances of financial crisis all the stock markets are high volatility and due to financial crisis setback of the daily return exist. Our study is proving that Chinese stock exchange is less affected in the condition of financial crisis as compare to other countries, whereas it has great influenced on the USA stock exchange. In major Asian stock exchange the volatility of stock returns are at moderate level while in the USA it has been remained. Secordaly, we have applied the Granger causality test that shows that after the financial crisis has impacted on the USA stock exchange is bidirectional and it did not receive any volatility spillover from other major Asian countries. Indian stock exchange experiences the volatility spillover from all the stock exchange, while, Japanese experiences volatility spillover from USA stock exchange .on the other side the china stock exchange do not experience of volatility spillover from any stock exchange.

Keywords:
Global financial crises-GARCH, volatility, Granger causality, Asian countries, stock returns.

1. INTRODUCTION

From the last thirty decades the significant of growth and improvement have been introduced, which can be defined in these words the free movement of goods and capital in between one or more country. There are two things which are the reason of obstruct the movement of capital from one country to another country. However, integration process has the positive aspect, throng this process one country can share its problem with another country. While international

integration is helpful to reduce the macroeconomic volatility. In the condition of financial crisis the liberalization of capital accounts may bring the unprotected position. According to Wang and Murrat (2010) instability of financial market is the reason of volatilizes of some other stock market. These types of transmission are known as the volatility spillover. According to Forbes and Rigoben (1998) in the position of financial crisis the increase the cross market correlation is known the contagion. It is also known as the spill effect of two different markets. Many scholars have been worked out on this issues that due to financial crisis, many Asian and USA stock exchange were affected very badly. In this study we are proving it by utilizing the data of three Asian countries and two USA stock exchanges. Various studies have examined the both long and short run relationship between Asian developing country and developed country. According to Chan, Pan (1992) examined the relationship by utilization the co integration test and they had found that there is long run relationship between them. Different scholars had also employed the Granger causality, VAR techniques and forecast error variance decomposition. In general, different studies had employed both long and short run dynamic causal linkage .Many scholars have been worked out on the history of stock exchange. The prime objective of the scholars is to find out the impact of financial crisis on the different stock market. Scholars have proved that financial crisis have always impacted on the financial markets. Arguably London stock exchange is known as the major stock exchange of the world. The history of London stock exchange start from 1698.At the start, the listed organization are the Jonathan s Coffe –house. At this time period, the listed companies are 2409 across the world. In the world, the American stock exchange is also considered as the oldest stock exchange of America. It was established in 1792.Two dozen brokers were started the stock trading. Now a day, 2,429 companies are listed under this stock exchange.

American stock exchange is also known as the Amex and it has the crucial role in the development of financial and business transactions. Moreover, it has added some other companies but could not meet the standard of New York stock exchange. History of Amex is showing that it was worked as the niche market player. Bombay stock exchange is also known as the oldest stock exchange of Asia. In 2015, the monthly trade of Bombay stock exchange is 11.9 $ billion. It was formed in 1875.Nasdaq is one of the stock exchange which introduced the electronics trading. At that time stock exchange was at the top position. It was established in 1971.this is the era of computer almost all securities dealers were utilized this way. In October 2004, the NASDAR was created the average record. In July 2007, it is believed that Global financial crisis has started. Due to liquidity crisis the US investors were left   to invest into the stock exchange. As the result, the US federal banks were invested large amount of capital into the financial markets. In 2008, the market was totally crashed, therefore investors were lost their confidence .After this US was suffered hosing bubble. Most of the citizens were not in the position to pay sub-prime loans .Due to this reason; many borrowers were defaulting on loans. These are the reasons that banks were faced the liquidly crisis. After the sometime US and Australian government were purposed a plan of 700 $ to overcome the liquidly crisis but all in vain. In 2008, most of the investors started to invest into the Gold, US dollar and bonds and it was found the safe alternative for investment. In January 2009, the president of Obama was first time proposed the package near about 1 $ trillion to collapse these financial crisis.
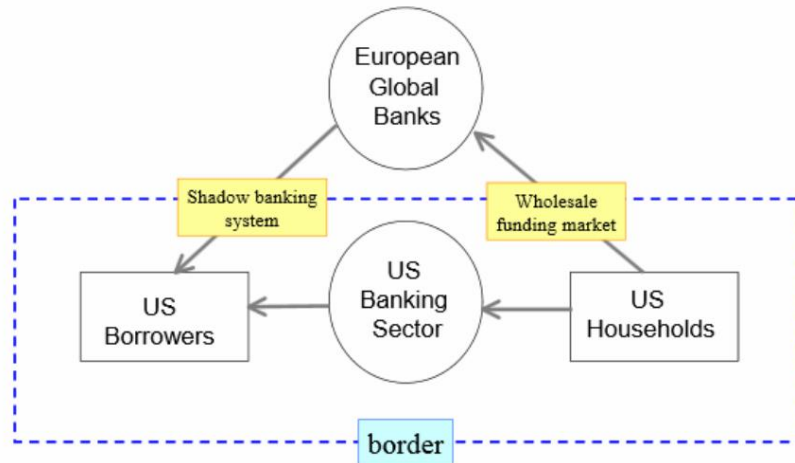
Figure 1. European global banks add intermediation capacity for connecting US savers and borrowers
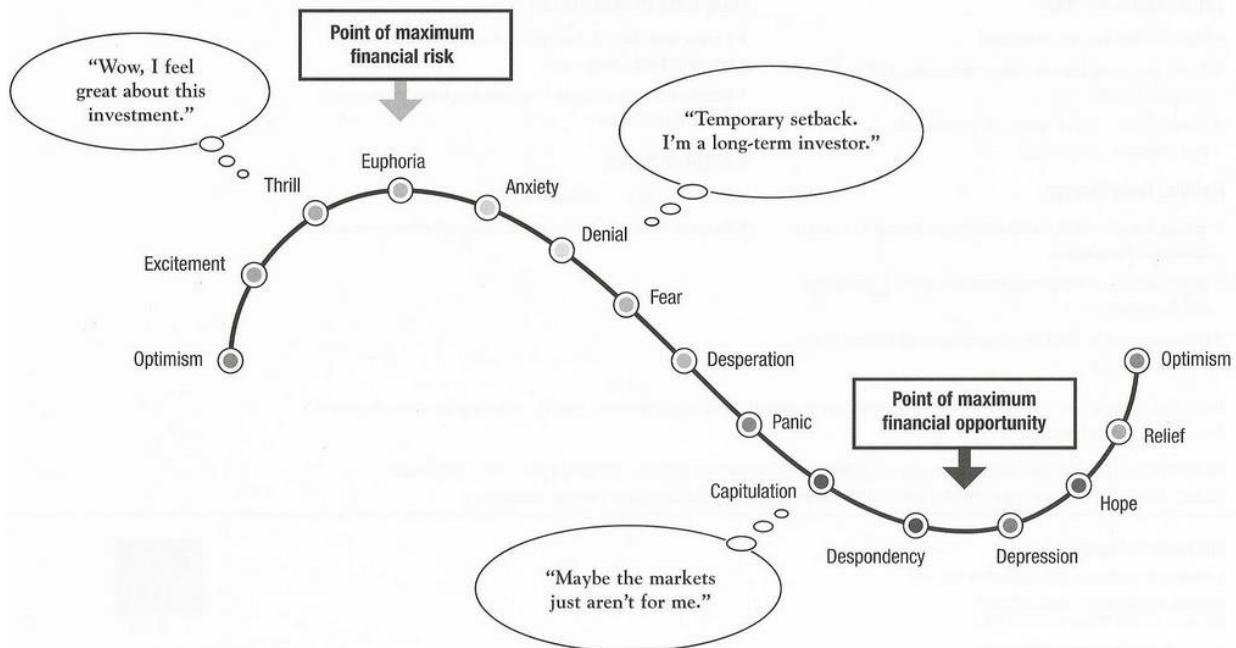

Figure 2:

2. SIGNIFICANT OF THE STUDY

The purpose of this study is to analysis the influence of financial crisis on the different stock returns with the help of using the E –GARCH model and analyzed that which stock markets are more and less affected. After utilization the Granger causality test we are proving that linkage of different stock exchange in the position of financial crisis. In addition, we have also analyzed that stock prices of different Asian countries are co integrated with world market or not.

3. LITERATURE REVIEW

There are three types of volatility which are being significant in this era. Robust of researchers have been study the different models to analysis the influence of financial crisis on the stock returns. Ke,wang,muray, analyzed the volatility spillover influence between Shanghai stock exchange and different stock market namely, New York, London an d Frankfurt and also did comparison between emerging countries and shanghai stock exchange through E-Garch model. Their results have shown that after the financial crisis there is bidirectional influence. This paper is also exploring that before the financial crisis the shanghai stock exchange was B shape and it had influenced on the Japan stock exchange [1].

Kim analyzed the efficiency of different stock markets and financial crisis 1997, impact on the performance of these stock markets. These studies have proved that Hong Kong was badly affected due to financial crisis [2].

Sakthivel, and Kamaiah had analyzed the independency between European and, Asian stock exchange and US market. They utilized the daily data for this purpose and applied the Johansen co integration method. This study is proving that Indian stock market was highly affected due to this financial l crisis [3].

Sakthival, BOdkhe, and Kamiah, observed the statistical relationship between major stock exchange .For this purpose they have utilized the Vicariate Garth model and found the results that there exist the long run co integration between them. This study is also proving that USA and Japan stock exchange had experienced the external shocks because these both stock exchanges are powerfully united due to their international trade [4].

Royfaizal, Lee, Azali, had analyzed the linkage between ASEAN countries and US stock exchange. They had applied the Granger causality test and found the result that these stock exchanges have linkage with each other [5].

Sigh, analyzed the linkage between Indian and Chinese stock market with developed countries he had utilized the daily data from period of 2000 to 2009 ,he had applied the ECM and granger causality .it is proving that Chinese and Indian stock exchange has correlation with the developed countries stock exchange[5].

Abidin , analyzed the asymmetric volatility in the stock exchange of New Zealand for the period of 2007-2008 .they had applied the E –Garch and T-Garch model and has shown the results that there exist the asymmetric volatility in this stock exchange [6].

Verma and Mahajan, employed the augmented E –Garch model on the stock prices of India .this study is showing that US. Financial dissolving has influenced on the Indian stock exchange [7]. Olowe, studies that volatility of the Nigeria stock returns for this purpose he had utilized the data from periods of 5 Jan 2005 to Jan 10, 2009.He had found that there is exist the high volatility and in the stock market there exists the risk return relationship [8].

Rafaqet, and Afzal, utilized the E –Garch model to analysis the global financial meltdown on the stock markets of India and Pakistan and found the results that negative shocks have pronounced impact on the both stock market. These markets are the facing persistent volatility clustering [9].

4. GAPS IN THE LITERATURE

1) In the prior studies had not discussed about the how convergence of the stock markets reruns on the sectoral level.
2) If there is convergence then how fast it is?
3) What is the impact of financial crisis on the integration of stock market?
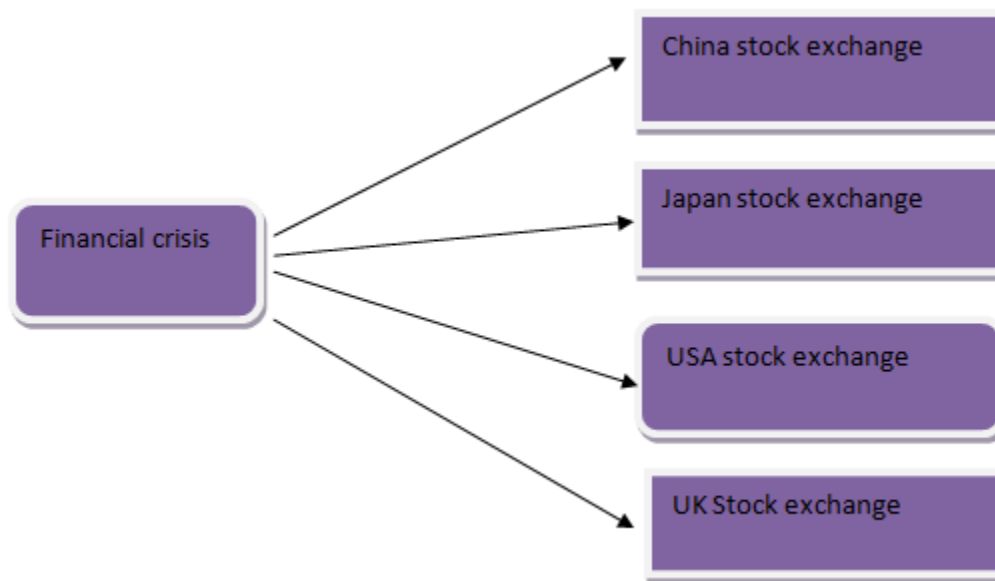4) Why China stock exchange has not any special influence and USA stock market affected very roughly.

Figure 3:

5. METHODOLOGY AND DATA

E –GARCH

The ARCH and GARCH models were first time introduced by the Engle (2001).the purpose of both models to analysis the set of issues. ARCH and EARCH model have the main role to deal with the heteroskedastic in the time series. These both models are utilized to measure the volatility measure. These have also main role in the decision of risk analysis, derivate pricing, and portfolio selection. EARCH model is a used to capture the statistical relationship between variance and stock returns. These models are also known as the leverage volatility models. In these models there are the Asymmetric response is showing that which sort of news effect on the return of stock exchange .our study is showing that negative news are more pronounced then good news. EGARCH model is also known as the earliest asymmetric information of GARCH model. Nelson was first time proposed in (1991).there is unique character tics of this model is

that there is allowed of innovations of different sings. In the GARCH model there is no negative coefficients exist. Due to the presence of logarithm there is no parameter space and negative constrains.

In the Verma and Mahajan (2012) model the representation of conditional specification and general mean are as follow.

Xt can be utilized for the time series variable

Xt=c +µt

In the above equation 'α' is known GARCH term .it is utilized to find out the final periods variance. The positive symbol of 'α' is showing that there is volatility clustering implying .the coefficient of γ is utilized to measure the influence of news on the previous year on the present period volatility.

In simple words, the words ARCH and GARCH are utilized to show the impact of present and old news on the stock market returns. The word ARCH model is utilized to describe about the impact of volatility on the present news. However, the purpose of GARCH model is to describe the influence of volatility on the previous news. Verma and Mahajan, 2012 have described in his paper that there is large effect of volatility then bad news.

DATA

Our study is based on the daily stock index closing prices of main two developed country and tan Asian emerging markets. The sample period consists of 1662 observations which is taken from Jan 2, 1995 to May, 15 2001.All stock indices are expressed in the shape of local currency and in the form of US dollar.oue source of data is data stream.

CO INTEGRATION ANALYSIS RESULTS

On the base, of Aaike information criterion we have selected the VAR model. In this research we have selected two logs. Diagnostic statistics is showing that residuals are free from autocorrelation problems. We are representation the Trace test results in table 1 and 2 respectively.

Table 1 and Table 2 display the basic statistical information about the stock return series for three sub-periods as well as entire period.

Table 1:

	Entire Period (6th of January, 2006 to 22nd of April, 2011)	Period 1 (6th of January, 2006 to 21st of January, 2008)	Period 2 (22nd of January, 2008 to 25th of March, 2009)	Period 3 (26th of March, 2009 to 22nd of April, 2011)
Mean	0.000297	0.001196	-0.001124	0.000221

Median	0.000565	0.001657	-0.001028	0.000417
Maximum	0.039234	0.022561	0.039236	0,020321
Minimum	-0.040196	-0.040198	-0.034934	-0.030327
Std.Dev.	0.008533	0.007896	0.011979	0.006527
Skewness	-0.448394	-1.023946	0.180803	-0.729034
Kurtosis	5.649954	6.296178	3.878892	5,287908
Jargue-Bera (Probability)	438.9354 (0.000000)	321.8785 (0.000000)	11.10193 (0.003885)	164.9976 (0.000000)
Observations	1347	514	296	539

Source: Results from Eviews-7

Positive sign of Kurtosis mean is showing that stock market return has the leptokurtic distribution. The purpose of standard deviation to estimate the volatility. These results are showing that during the financial crisis there is high standard deviation. This is proved that in the case of Shanghai stock exchange there is high level of volatility as compare to Indian stock exchange.

Table 2:

	Entire Period (6th of January, 2006 to 22nd of April, 2011)	**Period 1 (6th of January, 2006 to 21st of January, 2008)**	**Period 2 (22nd of January, 2008 to 25th of March, 2009)**	**Period 3 (26th of March, 2009 to 22nd of April, 2011)**
Mean	0.000233	0.000518	-0.00092	0.000512
Median	0.000543	0.000849	-0.000975	0.000565
Maximum	0.069444	0.028955	0.034313	0.069445
Minimum	-0.050396	-0.033423	-0.050398	-0.026095
Std.Dev.	0.008365	0.007087	0.012234	0.006687
Skewness	0.111931	-0.503934	-0.084916	2.091369
Kurtosis	8.958181	5.711593	3.695188	24.94131
Jargue-Bera (Probability)	1931.551 (0.000000)	176.4365 (0.000000)	6.060206 (0.048312)	10685.12 (0.000000)
Observations	1305	507	285	515

Source: Results from Eviews-7

Results are showing that daily mean for both sub –periods and entire periods are the Zero. This is proving that there must be large no of the rational profit maximizers.Mean returns are s high in the period of post crisis. However, these results are showing that financial breakdown has influenced on the daily stock return of Indian and shanghai stock exchange. Negatively skewed return showing that in both stock market there is irregular stock return during the financial crisis .These results are also showing that there is return in the Shanghai stock exchange as compared to Indian stock exchange. The other countries stock exchange like NYSE ,NIKKEI and BSE showing the same behavior like SSE .If there is high standard deviations during the financial crisis it mean there is high volatility exist.

Table 3: Unit root test

Stock return	SSE composite	BSE-30	Nikkei-225
ADF statistic	-36.69064 (0.0000)	-33.58153 (0.0000)	-37.65206 (0.0000)
ADF (I)	-36.72071 (0.0000)	-33.59568 (0.0000)	-37.65731 (0.0000)
ADF (I&T)	-36.78341 (0.0000)	-33.58375 (0.0000)	-37.64318 (0.0000)

Source: Results from Eviews-7

Unit root test

There is need of statistical adequacy to take the different in the time series. For this purpose we have utilized the unit root test. For checking the stationary of data we applied the ADF test. In the table no 3 and 4 have shown that there is not unit root exist between the time series all the stock return are stationary.

Table 4: Unit root test

Stock return	S&P 500	NYSE
ADF statistic	-30.79142 (0.0000)	-31.07222 (0.0000)
ADF (I)	-31.07223 (0.0000)	-31.06094 (0.0000)
ADF (I&T)	-30.78037 (0.0000)	-31.05638 (0.0000)

Source: Results from Eviews-7

ESTIMATION OF E-GARCH MODEL

In the table no 5 estimation of E-GARCH models for some stock exchange are given. Dummy variables are utilized to see the post crisis on the stock exchange-GARCH model is utilized to view the influenced of financial crisis n major stock exchange.

Table 5: Parameter Estimates of E-GARCH model for Shanghai composite stock exchange and Indian stock exchange.						
Coefficients (Probabilty)						
Variables						
	SSE composite		**BSE-30**		**Nikkei-225**	
Mean Equation						
j	0.000661	(0.00)	0.000506	(0.00)	-0.000134	(0.04)
$a1$	-0.001681	(0.02)	-0.001675	(0.01)	-0.000956	(0.01)
Variance Equation						
ω	-0.416478	0.00	-0.644639	0.00	-0.663649	0.00
α (ARCH effect)	0.136408	0.00	0.262676	0.00	0.139672	0.00
γ (Leverage effect)	-0.017721	(0.06)	-0.114367	0.00	-0.169615	0.00

β (GARCH effect)	0.967108	0.00	0.955135	0.00	0.947549 (0,0000)	
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T3	0.021457	(0.05)	0.035271	(0.05)	0.065364	(0.00)
t4	-0.016905	(0.00)	-0.020861	(0.04)	0.020517	(0.04)
Diagnostic test						
Q-Stat	All insignificant			All insignificant	All insignificant	
ARCH-LM						
F-Statistics	0.025269	(0.38)		1,034521 (0.3093)	0.376789	(0.54)
N*R2	0.025304	(0.39)		1,035289 (0.3089)	0.377261	(0.54)
Source: Results from Eviews-7						
Note: Number of Lag determination has been calculated by Akaike Information Criterion (AIC). It has been estimated 5% significance level.						

	Nikkei-225	
(0.00)	-0.000135	(0.05)
(0.01)	-0.00095	(0.02)
0.00	-0.663648	0.00
0.00	0.139673	0.00
0.00	-0.169616	0.00
0.00	0.947548 (0,0000)	
(0.05)	0.065365	(0.00)
(0.04)	0.020518	
All insignificant	All insignificant	
1,034521 (0.3094)	0.376787	(0.55)
1,0352897(0.3088)	0.377262	(0.55)

Note: Number of Lag determination has been calculated by Akaike Information Criterion (AIC). It has been estimated 5% significance level.

In the table no 5 we analyzed that shanghai stock exchange .After the utilization the mean value we can calculated the effect of financial crisis on the stock exchange of shanghai .The negative sign is showing that there is no more effect of financial crisis on the SSE composite. The value of coefficient of α is the 0.137 which is showing the significant impact. ARCH is useful to

showing that present news has influenced on the present period. The positive value of β is 0.968.it means that there is inverse relationship between favorable changes and opposite .it is showing the leverage effect. It means that negative news have more impact .in simple words it is showing that the in china the financial crisis has increased till 2.2%.the parameter of dummy variable is showing that significant relationship for the financial crisis. It is proving that there is inverse relationship between market volatility softened and financial crisis. The 2nd side of the table is explain the BSE -30 .it is significant at level 5 %.its negative sign is showing that there is low effect of financial crisis on the stock return. The diminishing value of crisis is 0.17.the value of coefficient of α is 0.264, which is significant. In addition, the value of ARCH showing that impact of the present news on the current stock outcomes. The value of parameter β is showing the volatility clustering and its value is 0.956.the value of volatility clustering is showing the predominates the stock exchange of India./If the market volatility become stubborn, it means that Indian stock exchange need long time period. It is clear that favorable change in past will become the reason of the change in the opposite direction. The value of coefficient γ is showing the negative effect which means that there is influenced of asymmetric information on the stock market. The estimation value of dummy variables is showing the significant result which mean that there is positive effect on the stock exchange. This table is showing the volatility 3.6%.the coefficient of dummy variable in the financial crisis is the showing the in the t3 is significant and its negative value is showing that after the March 2009, its stock volatility is smoothen. There is inverse relationship between financial market diminishes and stock market volatility. The value of third column is showing that analyzed the Nikkei-225 stock exchange. Nikkei stock exchange has the significant but negative sign. The value is showing that there is low impact on the financial crisis which is -0.oo2.this is showing that the outcome of the stock exchange Nikkei-225 is decreased by the 0.11% due to the reason of financial crisis. The value of coefficient is showing that there is ARCH effect its value is 0.141.it is also proving that current news has always influenced on the current periods. Both size volatility clustering and existence has shown predominates the value of Nikkei-225.here, the value of coefficient is showing that significant and negative sign. There is the present of asymmetric information. It has shown that there is powerful effect of the stock volatility. The value is proving that the value of 0.066 is the reason to increase the volatility of the stock exchange till 66%.the value of coefficient of dummy variable is showing that significance and positive value, which means that the volatility of stock is continuous after the month of March 2009.

Table 6: Parameter Estimates of E-GARCH model for S&P 500 and NYSE

Coefficients (Probability)

Variables

	S&P 500	NYSE
ị	0.000148(0.0094)	0.000138 (0,0089)
a_1	-0.001359 (0.0023)	-0.001358 (0,000)

Variance Equation

ω	-0.425422 (0.0000)	-0.433833 (0.0000)
α (ARCH effect)	0.084724 (0.0000)	0.091951 (0.0000)

γ (Leverage effect)	-0.172081 (0.0000)	-0.182682 (0.0000)
β (GARCH effect)	0.968422(0.0000)	0.968531 (0.0000)
$\dot{}_3$	0.070834 (0.0000)	0.071796 (0.0000)
$\dot{}_4$	0.024494 (0.0000)	0.023182 (0.0000)
Diagnostic test		
Q-Stat	All insignificant	All insignificant
ARCH-LM		
F-Statistics	8.529254 (0.0037)	8.770444 (0.0032)
N*R2	8.487652(0.0033)	8.726096 (0.0036)

Source: Results from Eviews-7

Firstly, we have estimated the S and p 500 stock exchange. The mean equation is showing the coefficient of financial crisis .it has shown that Shanghai is significant at 5 % and its negative sign is showing that due to financial crisis the Shanghai stock exchange was decreased by 0.015.the value of coefficient of α is 0.086 and showing the existence of ARCH model which had shown that present news had impacted on the present periods. The coefficient of β is showing that the present of GARCH model. For the decay of volatility there is need of long period. The value of coefficient is -0.0172083 it is showing that leverage effect. The negative sign shows that negative news have stressed on the stock market.t3 has significant value which is showing the positive effect of market volatility. This is showing that financial crisis increased by 7.2%.t4 is showing that volatility is still same after the financial crisis. the 2nd column of table no 6 is showing the behavior of NYSE .mean equation is showing that coefficient is significant at level 5 %and negative sign is trying to show that there is little effect of financial crisis on the stock exchange. It is showing that NYSE stock exchange diminished till 0.014%.the value of α is showing the significant effect. It is also showing that recent news has always impact on the current periods. The parameter of β is 0.969 which is showing the volatility clustering. .It is showing the volatility clustering of NYSE. It has proved that if the market volatility is stubborn it needs the long time period .this thing will positive change in the past .it is showing the evidence that asymmetric impact always influenced on the stock market.t4 has the significant value and positive sign is showing that volatility will continuous till March ,2009.futher,Q –stat value are more than 36 lags which has insignificant value, This is providing the information is that volatility is 7.3%.the positive sign and significant sign is showing that market volatility continued till March 2009.

6. SUGGESTION

1) There should be proper integration of different Asian stock market with global stock market.
2) There is needed to make policy makers for this purpose.
3) USA stock exchange should do work against the financial crisis.
4) Japan also should apply some policies against such type of financial crisis.

7. CONCLUSION

Our results is showing that global financial crisis become the reason of decrease the stock return. Global financial crisis has become the increase the volatility of different Asian countries and volatility of stock prices of USA stock exchange. The result of EARCH model is showing that financial crisis has not more affected on the China s stock exchange as compared to other stock exchange. In the large extent global financial crisis has influences on the USA stock exchange. The results of Granger causality are showing that at the start of financial crisis the USA stock exchange has the bidirectional influenced on the Asian stock exchange. Due to USA stock exchange Japanese stock exchange receives the volatility spillover. Our paper has examined that Chinese stock exchange do not receive the volatility spillover.

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