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Financial Markets Interdependence: Evidence from South and East Asian Countries

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ABSTRACT

The aim of this study is to provide a clear picture of relationship between south and East Asian stock markets. Financial and economic literature discussed the financial market integration. The information easily transferred from one market to another due to financial market integration. The data is collected from respective financial market websites. GARCH 1, 1 model is used to develop the volatility series and Quantile regression is used to check the financial markets interdependence. The results show significance dependence between financial markets which means there is volatility transmission in these markets. The geographical proximity also associated with the volatility transmission. This study is helpful for the investors of South and Asian countries to check the stock market stability for making investment decision. The investors from the developing countries took help from this study if they are going to invest big.

Introduction

It is observed that portfolio investment, foreign direct investment and different trade agreements are increasing in past few decades. By these activities, financial stock markets are integrating rapidly. This integration has started from geographically and then it captured global stock markets. Through the integration some countries have economically dominant on rest of the countries. Integration also provides many benefits like financial and economic development, increase in FDI and portfolio investment and also increase competitive behavior.

Mean and volatility spillover is used to explore the transmission of information between financial markets (Bhar and Nikolova, 2007). Volatility transmission is also transferring the economic shocks from one country to another. The emerging countries are influenced by developed countries by their economic dependence. These effects may positive or negative which are investigated by many researchers in Latin America,

Europe, Africa, Mena and BRICK. Susmel and Engle (1994) studied this behavior and their results differ from country to country.

Portfolio investors and economic policy makers have interest about volatility spillover because its effects on economic performance may positive or negative. They also concerned about the smooth operation of financial institutions which may effects by volatility spillover. Mean return and volatility found in regional level and in international level. Therefore, it is necessary for Portfolio investors and economic policy makers to have knowledge about financial information across the border.

The international investors diversify their investment with the help of international portfolio managers. To diversify their investment it reduces the chance of risk. It creates contacts between different markets. This behavior creates volatility transmission between different markets. So this study based on Efficient Market Theory developed by Fama (1970 & 1991). It argues that the price set to the arrival of new information. The information about integration of market flows from one market to another, so unexpected movement creates volatility in market.

The main objective of this study is to investigate the interdependencies between South Asian and East Asian financial stock market. Quantile regression approach is used in this study to obtain the objectives which is developed by Koenken (2001). It calculates the interdependence between financial markets in different circumstances, lower quantile, mean quantile and upper quantile.

Literature Review

Many studies have been done on volatility spillover by many researchers for a long time. During the past few decades the financial literature has focused on volatility transmission between developing stock markets (Hamao et al., 1990; Kearney, 2000). After reviewing the financial literature, we found that in global integration in equity markets are also shuffled by equity market factors that have major concern with investor and academia. This chapter presents previous studies by the reference of different methodologies on this subject.

Gileko and Fedorova (2014) studied the internal and external relationship of BRIC and Global markets. Transmission of vitality is measured through stochastic volatility models between the stock markets. But the GARCH models are consider as mare reliable to market transmission. Many studies are used to investigate the relationship by these types of models. In So et al. (1997) used stochastic volatility model to analyses the volatility transmission in 7 Asian equity markets. And the result shows that there is volatility transmission in these markets. SV (stochastic volatility model)is used to investigate the return of US, Korea, Japan an90d Thailand.

Darrat&Benkata (2003) worked on the interdependence between Turkey stock market and America, England, Japan and Germany. His study shows, Turkey market has significance relationship with US, UK, Germany and Japan since 1989. It shows that the UK and USA financial markets are the main source of integration.

Aggarwal et al. (1999) used two approaches in his model.Todeterminethe volatility by ICSS approach and use dummy variable in GARCH model. His study indicates that the local factors are cause of volatility change.

In recent studies to explore interdependence in markets Quantile regression has given significance importance. Quantile regression is significantly identified the non linear and asymmetric behavior in financial markets (Baur, 2013). It analyses in different quantiles to check asymmetric behavior. It also provide flexibility and give a new idea about the research problem.

Baur (2013) recommended quantile regression for markets analysis. It help to calculate the relationships through multivariate asymmetry. Market integration is discussed in both financial and economic literature. It helps in transforming the information from one market to another. Susmel and Engle (1994) stated that the behavior of volatility vary from country to country. And it is the only source which develops volatility among markets. Average impact is calculated by linear regression. This method is useful and flexible to investigate the problems.

H1: The financial interdependence exists among South Asian and East Asian stock markets.

Material and Methods

Data

This study use volatility series to investigate the interdependence between South and East Asian countries. The volatility series is generated by standard GARCG model. Daily data is used which is available from Jan. 01, 2010 to June 30, 2021. And these countries are selected because their economy is growing rapidly during last decades.

Following equation is used for quantile regression:

$$Qy(T|x) = info\{b|Fy(b|x) \geq T\} = \sum k\omega k(T)xk = x\omega(T)$$

The depended variable is denoted by y which is consider to linear independent variable of x and Fy(b/x)is the conditional distribution function of y given x. β(τ), τ ∈ [0, 1] represent the QR coefficient, that can determines the dependence relationship between vector x and the τth conditional quantile of y. Dependence is unconditional if no exogenous variables are included in x. The values of β (τ) determine the complete dependence structure of y. The dependence of y based on a specific explanatory variable in vector x could be: (a) constant where the values β (τ) do not change for different values of τ; (b) monotonically increasing (decreasing) where β(τ) increases (decreases) with the value of τ; and (c) symmetric (asymmetric) where the value of τ is similar (dissimilar) for lower and upper quantiles.

a) Correlation Matrix

b) Unit Root Test

c) GRACH volatility spillover

d) Quantile regression approach

Results and Discussion

Table 1
Descriptive Statistic

	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Be	ADF Statist
RBSE	0.027	0.013024	-0.42706	14.15075	31381.81	-0.97609**
RCSE	0.0398	0.009509	0.347516	52.11001	605280.3	-0.91126**
RKSE	0.0541	0.011269	-0.25702	9.618648	11058.08	-0.85753**
RNIKI	0.00289	0.012772	-0.44715	13.25561	26591.49	-1.03274**
RSZSE	0.0254	0.051966	-0.06055	1274.087	4.05E+08	-2.05912**

This table presents the descriptive statistic of monthly returns. It shows in column one to five the mean, the std. dev., the Skewness, the Kurtosis, the Jarque-beta. The average monthly return of India, Sri Lanka, Pakistan, China and Japan is 0.027, 0.039, 0.054, 0.028 and 0.054 respectively. Std. deviation of India, Sri Lanka, Pakistan, China and Japan is 0.013, 0.095, 0.011, 0.012 and 0.51 respectively. Moreover the returns found negatively skewed in India, Pakistan, China and Japan (-0.42,-0.34,-0.44,-0.06) and positively skewed in Sri Lanka (0.34). the value of Kurtosis is higher than 3 whish shows that the data is leptokurtic. The Jarque-Berra test rejects the null hypothesis of normality.

Table 2
Estimation of GARCH (1, 1)

	India	Sri Lanka	Pakistan	Japan	China
Ω	1.80	1.53	3.10	2.08	-5.21
	0	0	0	0	0
G	0.067813	0.172005	0.088073	0.059946	4.701265
	0	0	0	0	0
Λ	0.922219	0.841841	0.887402	0.927962	0.431144
	0	0	0	0	0
(g + λ)	0.990032	1.013846	0.975475	0.987908	5.132409

This table presents variance equation of GARCH model:$h_{t=\,\omega+\,\delta\varepsilon^2{}_{t-1}+\,\lambda h_{t-1}}$. The ARCH and GARCH coefficients (0.067, 0.922) are statistically significant for India and the sum of ARCH and GARCH is 0.99 which indicates that the volatility exist in Indian market. The ARCH and GARCH coefficients (0.172, 0.841) are statistically significant for Sri Lanka and the sum of ARCH and GARCH is 1.013 which indicates that the volatility exist in Sri Lanka market. The ARCH and GARCH coefficients (0.088, 0.887) are statistically significant for Pakistan and the sum of ARCH and GARCH is 0.975 which indicates that the volatility exist in Pakistan market. The ARCH and GARCH coefficients (0.059, 0.92) are statistically significant for Japan and the sum of ARCH and GARCH is 0.98 which indicates that the volatility exist in Japan market. The ARCH and GARCH coefficients (4.701, 0.431) are statistically significant for China and the sum of ARCH and GARCH is 5.132 which indicates that the volatility exist in China market.

Table 3
QR Analyses

	DV: India					
IV	0.05		0.5		0.95	
Sri Lanka	0.011***	0.009	0.001	0.2617	0.261***	0.011
Pakistan	0.051***	0.000	0.256	0.000	1.057***	0.000
Japan	0.079***	0.000	0.510	0.000	1.762***	0.000

China	7.005***	0.001	-0.00437	0.2095	-0.005***	0.0004
R-sq	0.0453		0.1715		0.3225	

This table reports the estimation results of the quantile regression model, it can deduce that the model is able to describe and assess in an appropriate manner, the interdependence of volatility series. Indeed, the explanatory power of the exogenous variables associated with each quantile (0.05, 0.5 and 0.95) is generally high. Where India is considered dependent and Sri Lanka, Pakistan, Japan and China are considered independent stock markets. Coefficient shows that there is empirically significant impact on Indian market by Sri Lanka, Pakistan, Japan and China at lower level and upper level. The value of coefficients at lower level is 0.011, 0.051, 0.079 and 7.005 respectively. And the coefficients values at upper level at 0.261, 1.057, 1.762 and -0.005.

Table 4
QR Analyses

DV: Sri Lanka						
IV	0.05		0.5		0.95	
Pakistan	0.010***	0.000	0.019**	0.0253	-0.079	0.3537
Japan	0.009**	0.061	0.119***	0.000	0.108	0.3973
China	-0.00134	0.9446	-0.0011**	0.0213	-0.0013***	0.000
Sri Lanka	0.002	0.1733	0.020**	0.0109	0.179	0.3301
R-sq	0.00541		0.0222		0.0486	

Here Sri Lanka is considered dependent and India, Pakistan, Japan and China are considered independent stock markets. Coefficient shows that there is empirically significant impact on Sri Lanka market by India, Pakistan, Japan and China at lower level, middle level and upper level. The value of coefficients at lower level is 0.010, 0.009 and 0.079. And coefficient values at middle level are 0.19, 0.119, -0.001 and 0.020 respectively. And the coefficients values at upper level are -0.0013.

Table 5
QR Analyses

DV: Pakistan						
IV	0.05		0.5		0.95	
Japan	-0.029***	0.000	-0.053*	0.0413	-0.230***	0.000
China	-2.867	0.3008	-1.996***	0.001	-1.205***	0.000
India	0.026***	0.000	0.117***	0.000	0.856***	0.000
Sri Lanka	3.103** *	0.000	-5.883***	0.0008	-3. 02***	0.000
R-sq	0.0317		0.0236		0.1340	

Here Pakistan is considered dependent and India, Sri Lanka, Japan and China are considered independent stock markets. Coefficient shows that there is empirically significant impact on Pakistan market by India, Sri Lanka, Japan and China at lower level, middle level and upper level. The value of coefficients at lower level is -0.029, 0.026 and 3.103. And coefficient values at middle level are -0.053, -1.996, 0.117 and -5.88 respectively. And the coefficients values at upper level are -0.230, -1.205, 0.856 and -3.02 respectively.

Table 6
QR Analyses

	DV: Japan					
IV	0.05		0.5		0.95	
China	7.337	0.0997	-1.70E-06	0.0025	-8.06***	0.000
India	8.802***	0.000	0.254	0.000	1.483***	0.000
Sri Lanka	1.883	0.9483	0.025***	0.000	-0.007	0.3894
Pakistan	-1.22**	0.0053	-1.052	0.3546	-0.033***	0.000
R-sq	0.046369		0.099735		0.452322	

Here Japan is considered dependent and India, Sri Lanka, Pakistan and China are considered independent stock markets. Coefficient shows that there is empirically significant impact on Japan market by India, Sri Lanka, Pakistan and China at lower level, middle level and upper level. The value of coefficients at lower level is 8.802 and 1.22. And coefficient values at middle level is 0.025. And the coefficients values at upper level are -8.06, -1.483 and -0.033 respectively.

Table 7
QR Analyses

	DV: China					
IV	0.05		0.5		0.95	
India	0.009	0.7735	0.349**	0.013	5.598	0.3839
Sri Lanka	-0.0003	0.9762	-0.177***	0.000	-1.612***	0.000
Pakistan	0.0082	0.8545	0.279***	0.000	-1.294	0.6378
Japan	1.142	0.8876	0.866***	0.000	4.154	0.2424
R-sq	0.0145		0.0730		0.0795	

Here China is considered dependent and India, Sri Lanka, Pakistan and Japan are considered independent stock markets. Coefficient shows that there is empirically significant impact on China market by India, Sri Lanka, Pakistan and Japan at lower level, middle level and upper level. The values of coefficient at middle level are 0.349, --0.177, 0.279 and 0.866 respectively. And the coefficients values at upper level is -1.612.

Conclusion

Quantile regression approach is used in this study to check the relationship of markets. For this purpose this approach is found satisfactory. Three emerging countries Pakistan, Sri Lanka and India and two developed Countries China and Japan are included in this study.

Overall, this study proves the volatility transmission between South and East Asian financial markets. This is an evidence which strengthen the argument financial integration between developing and developed countries. This study also identified that geographical proximity increase volatility transmission. The results shows that there is volatility transmission between all markets of South and east Asian countries but there is strong connectionbetween Pakistan and Japan, Pakistan and India and Pakistan and Sri Lanka stock markets at an absolute level (all three quantiles are significance). The results show that there is significance impact of Pakistan, Sri Lanka, China and Japan on Indian stock market. Their coefficients are significant at Bearish and Bullish movement. Pakistan and Japan have significance impact on Sri Lanka stock exchange at Bearish and

mean movement. China has significance impact on Sri Lanka at mean level. The Indian stock market has significance impact on Sri Lanka at mean and bullish movement. The Japan, India and Sri Lanka have absolute significance impact on Pakistan stock exchange and China has significance impact on Pakistan stock exchange at mean and bullish movement.

According to results India and Pakistan stock exchange has significance impact on Japan stock exchange at bearish and bullish movement. China and Sri Lanka have significance impact on Japan stock exchange at mean and bullish movement respectively. Pakistan, India and Japan have significance impact on China stock exchange at mean. And the Sri Lanka stock exchange has significance impact on Pakistan stock exchange at mean and bullish movement.

The question which is frequently ask by the Govt. policy makers in developing markets: how risk and volatility transmission is avoided? Many previous studies answer the following question that it is necessary for developing economies to rationalise their financial and economic system. They need to be develop their systems according to the world demand.

The results shows that the transmission of volatility spillover has significance impact on South and East Asian countries, which is helpful for the investors who intend to invest in these countries. According to this study the interdependence between Pakistan and Japan, Pakistan and India and Pakistan and Sri Lanka stock markets has on absolute level which is very attract full for domestic and international investors.

This study is helpful for the investors of South and East Asian countries to check the stock market stability for making investment decision. It is more helpful for emerging countries (south Asian countries) investorsto invest in the develop countries (East Asian countries).

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