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A Study on The Volatility Transmission and Spill Over Among Selected SAARC Stock Market

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ABSTRACT

This research is aimed at how GARCH-type models could be used to estimate the volatility of stock market performance in six SAARC emerging markets. For the period of 01.04.2010 to 31.03.2020, we used daily data from AFX (Afghanistan stock market), BSE (Bombay Stock Exchange), DSE (Dhaka Stock Exchange), NSE (National Stock Exchange), KSE (Karachi Stock Exchange), and CSE (Colombo Stock Exchange). The GARCH influence is substantial. We conclude that volatility shocks are fairly persistent among selected SAARC stock markets, and that old news has a noteworthy impact on volatility. Future study should look into how multivariate time series replicas function when used with daily returns from international emerging markets.

Keywords: SAARC stock market, volatility, GARCH Model

INTRODUCTION

A stock market is a location where buyers and sellers of stocks/shares can conduct business at a set price. There are both publicly traded and confidentially traded stocks among the stocks. The transmission of shares (stocks and securities) for money from a seller to a buyer is mentioned to as a stock market agreement. Small individual investors to huge institutional traders, as well as banks, insurance firms, pension funds, hedge funds, as well as other institutions, all invest in the stock market. A country's capital creation is heavily prejudiced by the stock market. The stock market is widely regarded as the most accurate indication of a country's economic situation. The stock market is regarded as the most important measure of a country's economic health, strength, and progress. It allows businesses to raise additional funds for investment by selling shares or comparable units of the company's ownership in the open market. Investors could take part in the transaction by purchasing stock on the stock exchange. The stock market provides liquidity, allowing investors to buy and sell their shares. As a result, investing in stocks provides more liquidity than investing in less liquid assets such as real estate. As a result, the stock market is often said to as a replication of the country's economy.

The comprehensive autoregressive conditional heteroskedasticity (GARCH) process is an econometric term coined in 1982 by economist Robert F. Engle, who won the Nobel Memorial Prize in Economics in 2003. The GARCH method is a method for estimating financial market volatility. GARCH modelling comes in a variety of ways. When trying to foresee the prices and rates of financial devices, financial experts often prefer the GARCH process because it delivers a more realistic backdrop than other models. In a statistical model, heteroskedasticity relates to the irregular pattern of dissimilarity of a standard error, or variable. In essence, where heteroskedasticity exists, observations do not follow a linear pattern. Rather, they tend to congregate. As a result, the model's results and predictive usefulness will be suspect. The GARCH model equation is a financial data analysis technique that can be used to analyse a wide range of financial data, including macroeconomic data. This method is commonly used by financial organisations to estimate the volatility of stock, bond, and market indices returns. They use the data to help with asset provision, hedging, risk management, and asset allocation conclusions by determining pricing, judging which assets may possibly generate higher returns, and forecasting the returns of present investments. There are three ways of generating a GARCH model in general. The first step is to create an autoregressive model that fits the data the best. The second step is to calculate the error term's autocorrelations. The significance test is the third step.

REVIEW OF LITERATURE

- A Kotishwar, (2020) "Global Markets Effect On Stock Market Volatility With Reference To SAARC Nations – A Study," in A Kotishwar, "Global Markets Effect On Stock Market Volatility With Reference To SAARC Nations – A Study," in A Kotishwar, "Global Markets Effect On Stock For the past two decades, the economies of the countries of South Asia have been rapidly expanding. Chinese and Indian economies have seen

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considerable growth among the SAARC nations. The purpose of this research is to know about the functioning of SAARC countries' equities markets. The study took secondary data from 2015 to 2020 into consideration. The study looked at how well the returns performed. According to the Modigliani approach, the risk-return performance of India and Pakistan is better than that of other SAARC countries. The study used the volatility of the markets to look into it.

- Erginbay Ugurlu,(2014)"Modeling Volatility in Stock Markets Using GARCH Models: European Emerging Economies and Turkey," The application of GARCH-type models for simulating volatility of stock market returns in four European emerging countries and Turkey is investigated in this study. We use daily data from Bulgaria (SOFIX), the Czech Republic (PX), Poland (WIG), Hungary (BUX), and Turkey (XU100), which are all emerging financial markets. For the returns of PX and BUX, WIG and XU, we discover GARCH, GJR-GARCH, and EGARCH effects, however there is no substantial GARCH effect for SOFIX.

OBJECTIVES OF THE STUDY

- To examine the normality and stationarity of stock markets in selected SAARC countries.
- To study the volatility transmission and spill over effects appearing in the stock markets of selected SAARC countries

RESEARCH HYPOTHESES

H1: There is no normality among the indices of emerging selected SAARC stock markets.
H2: There is no stationarity among the indices of emerging selected SAARC stock markets.
H3: There is no significant volatility transmission and spill over among the selected SAARC nations.

RESEARCH METHODOLOGY

SAMPLE DESIGN

The study aimed at investigating investigation on the efficient markets of equity markets in selected SAARC countries, and the transmission of volatility among SAARC stock markets. For revising the objectives, a sample of daily closing prices from SAARC countries' marketplaces was used:

1. India (Bombay Stock Exchange (BSE) & National Stock Exchange (NSE)),
2. Bangladesh Stock Exchange (DSE),
3. Pakistan Stock Exchange (KSE),
4. Sri lanka Stock Exchange (CSE) and
5. Afghanistan Stock market (AFX).

SOURCE OF DATA

The current research is based on secondary data. The data for this analysis was gathered from daily reports on the official websites and magazines of the following SAARC nations' stock exchanges.

PERIOD OF STUDY

The researcher has taken a closing price of SAARC stock markets under study from 01.04.2012 through 31.03.2022 i.e., for Ten years.

TOOLS USED FOR ANALYSIS

For the resolve of analysis of this study, the statistical tools such as descriptive statistics, ADF and GARCH (1,1) model.

Descriptive statistics of the SAARC stock market from 2012 to 2022

	BSE_VOL	CSE_ VOL	DSE_ VOL	AFX_ VOL	NSE_ VOL	KSE_ VOL
Mean	0.297440	0.000376	5.62E-05	-8.49E-05	-0.000184	-8.49E-05

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Median	-0.907631	0.000000	-7.33E-05	-0.000902	-0.000532	-0.000902
Maximum	1284.008	0.140885	0.071194	0.067700	0.149167	0.067700
Minimum	-561.9944	-0.038434	-0.087561	-0.048535	-0.062131	-0.048535
Std. Dev.	0.71145	0.007537	0.008920	0.011164	0.010797	0.011164
Skewness	2.65933	2.919002	-0.116954	0.785886	2.316948	0.785886
Kurtosis	342.6621	81.98642	14.49009	6.967768	32.17969	6.967768
Jarque-Bera	8140.130	4445.508	9267.402	1277.991	6125.41	1277.991
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	1684	1684	1684	1684	1684	1684

The results of descriptive data for the sample indices (daily returns) of SAARC emerging markets from April 1, 2012 to March 31, 2022 are presented. The normality of indices was tested using the mean, standard deviation, skewness, kurtosis, and JB test, as previously indicated. During the period 2012-22, the mean average returns for all sample indices were positive, with the exception of AFX, which had a value of -8.49E-05, NSE, which had a value of -0.000184, and KSE, which had a value of -8.49E-05,during the period 2012-22. However, when compared to the other five sample indexes, the BSE Index's mean return (0.297440) was the highest. The BSE Index (India) has the largest standard deviation (0.71145), indicating the greatest risk, followed by the KSE Index (0.011164), CSE (0.007537), S&P CNX Nifty (India) (0.010797), AFX Index (0.011164), and DSE Index (0.008920). All of the sample indices were predicted to have skewness values ranging from -3 to +3 for all six sample stock market indexes in period 2012-22. The observed values were more than three, according to Kurtosis' research. The values for all sample indices were not larger than 0.05 in period 2012-22 according to the Jarque Bera (JB Test). This means that out of the six sample indices, all of them were significantly normalised. The returns data for each of the six sample indexes was normally distributed. Hence the null hypothesis (H1) - there is no normality among the indices of selected SAARC emerging stock markets during the period from 01st April, 2010 to 31st March, 2020, was rejected.

Unit Root Test

Augmented Dickey-Fuller test of the SAARC stock market during the period from 01.04.2012 to 31.03.2022

Variable	**ADF stat**	**Prof**
BSE	-48.5875	**0.0000**
CSE	-31.5444	**0.0000**
DSE	-34.8832	**0.0000**
AFX	-32.8596	**0.0000**
NSE	-48.07	**0.0000**
KSE	-32.8596	**0.0000**

Aside from data stationarity investigations, the level of series is also established. The notion of a Unit Root is decisively rejected by Augmented Dickey-Fuller (ADF) statistics at the 5% level of significance for all six countries' stock market indexes returns.

GARCH (1,1) Model of Afghanistan stock exchange Index during the period from 01.04.2012 to 31.03.2022

Mean Equation – GARCH (1,1) model				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.000451	6.11E-05	7.380976	0
AFX__VOL(-1)	0.943182	0.005845	161.3667	0
Variance Equation				
C	6.01E-08	7.11E-09	8.461417	0
RESID(-1)^2	0.035171	0.003322	10.58831	0
GARCH(-1)	0.928095	0.006778	136.9351	0

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The results of the GARCH in mean model applied on the Afghanistan Index returns indicates that the slope coefficient of the GARCH model in the mean equation is found to be 0.93 with the probability value of 0.000. Since the probability value of the slope coefficient of the GARCH model is found to be less than five percent level of significance. Thus it can be determined from the results that there exists the significant impact of conditional volatility in the Afghanistan Index returns on the provisional returns of the Afghanistan index returns.

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GARCH (1,1) Model of Dhaka stock exchange Index during the period from 01.04.2012 to 31.03.2022

Mean Equation – GARCH (1,1) model				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	2.36E-04	4.15E-05	5.694937	0
DSE_VOL (-1)	0.955145	0.005664	168.632	0
Variance Equation				
C	1.54E-08	1.23E-09	12.52632	0
RESID (-1)^2	0.055801	0.003403	16.39697	0
GARCH (-1)	0.927338	0.003002	308.9417	0

The results of the GARCH in mean model applied on the **Dhaka stock exchange** Index returns indicates that the slope coefficient of the GARCH model in the mean equation is found to be 0.93 with the probability value of 0.000. Since the probability value of the slope coefficient of the GARCH model is found to be less than five percent level of significance. Thus it can be concluded from the results that there exists the significant impact of conditional volatility in the **Dhaka stock exchange** Index returns on the conditional returns of the **Dhaka stock exchange** index returns.

GARCH (1,1) Model of Karachi stock exchange Index during the period from 01.04.2012 to 31.03.2022

Mean Equation – GARCH (1,1) model				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.000271	2.11E-06	128.7721	0
KSE_VOL(-1)	0.989869	0.002364	418.7134	0
Variance Equation				
C	2.83E-08	2.68E-09	10.5546	0
RESID(-1)^2	0.048189	0.002899	16.62149	0
GARCH(-1)	0.936969	0.003599	260.3543	0

The results of the GARCH in mean model applied on the **Karachi stock exchange** Index returns indicates that the slope coefficient of the GARCH model in the mean equation is found to be 0.936 with the probability value of 0.000. Since the probability value of the slope coefficient of the GARCH model is found to be less than five percent level of significance. Thus it can be concluded from the outcomes that there exists the significant impact of conditional volatility in the **Karachi stock exchange** Index returns on the provisional returns of the **Karachi stock exchange** index returns.

GARCH (1,1) Model of National Stock Exchange Index during the period from 01.04.2012 to 31.03.2022

Mean Equation – GARCH (1,1) model				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.000501	4.75E-05	10.55912	0
NSE_VOL(-1)	0.932495	0.00476	195.9138	0
Variance Equation				
C	3.99E-08	2.78E-09	14.33919	0
RESID(-1)^2	0.051505	0.002666	19.32191	0
GARCH(-1)	0.927863	0.003192	290.6958	0

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The results of the GARCH in mean model applied on the **Nifty** Index returns indicates that the slope coefficient of the GARCH model in the mean equation is found to be 0.93 with the probability value of 0.000. Since the probability value of the slope coefficient of the GARCH model is found to be less than five percent level of significance. Thus it can be concluded from the results that there exists the significant influence of conditional volatility in the **Nifty** Index returns on the provisional returns of the **Nifty** index returns.

GARCH (1,1) Model of Colombo stock exchange Index during the period from 01.04.2012 to 31.03.2022

Mean Equation – GARCH (1,1) model				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.000375	3.50E-05	10.71189	0
CSE_VOL(-1)	0.901959	0.006884	131.026	0
Variance Equation				
C	2.55E-08	2.34E-09	10.91555	0
RESID(-1)^2	0.115244	0.006277	18.35937	0
GARCH(-1)	0.878165	0.003588	244.7716	0

The results of the GARCH in mean model applied on the **Colombo stock exchange** Index returns indicates that the slope coefficient of the GARCH model in the mean equation is found to be 0.88 with the probability value of 0.000. Since the probability value of the slope coefficient of the GARCH model is found to be less than five percent level of significance. Thus it can be concluded from the results that there occurs the significant impact of provisional volatility in the **Colombo stock exchange** Index returns on the conditional returns of the **Colombo stock exchange** index returns.

GARCH (1,1) Model of Bombay Stock Exchange Index during the period from 01.04.2012 to 31.03.2022

Mean Equation – GARCH (1,1) model				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.000469	4.53E-05	10.36118	0
BSE_VOL(-1)	0.935385	0.005108	183.109	0
Variance Equation				
C	1.49E-08	1.51E-09	9.845246	0
RESID(-1)^2	0.045567	0.00248	18.37554	0
GARCH(-1)	0.950169	0.002165	438.8731	0

The results of the GARCH in mean model applied on the SENSEX Index returns indicates that the slope coefficient of the GARCH model in the mean equation is found to be 0.95 with the probability value of 0.000. Since the probability value of the slope coefficient of the GARCH model is found to be less than five percent level of significance. Thus it can be concluded from the results that there occurs the significant impact of conditional volatility in the SENSEX Index returns on the provisional returns of the SENSEX index returns.

Conclusion

Emerging economies are critical for global economic growth. Stock markets are a good measure of how well a country's economy is doing. While econometric models are used to study financial information such as stock markets, they contain particular structures that linear approaches cannot model, such as leptokurtosis, leverage effects, volatility clustering (or pooling), volatility smile, and long memory. The research presented in this article looks into the SSARC stock market's six emerging markets. To specify volatility processes in returns of their stock markets, we was using a GARCH type model, which included the AFX (Afghanistan Stock Exchange), BSE (Bombay Stock Exchange), DSE (Dhaka Stock Exchange), and NSE (National Stock Exchange).), KSE (**Karachi stock exchange**) and CSE

(**Colombo stock exchange**) for 01.04.2010 to 31.03.2020 period. The findings revealed that all markets have considerable GARCH effects, hence it is suggested that future research look into GARCH models for selected SAARC stock markets. We discovered that volatility shocks are quite predictable in all six markets, and that old news has a large impact on volatility. The Polish stock market has the longest memory on alteration of all the markets observed. Furthermore, the results show that bad news increases volatility and that the markets have a leveraging influence on returns. Future studies should look into the presentation of multivariate time series models when retaining daily returns from emerging markets around the world.

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