P-ISSN 2664-0422	Pakistan Social Sciences Review	Oct-Dec 2023, Vol. 7, No. 4
O-ISSN 2664-0430	https://doi.org/10.35484/pssr.2023(7-IV)48	[526-540]

Pakistan Social Sciences Review
www.pssr.org.pk

RESEARCH PAPER

Dynamic Relationship between Stock Returns, Trading Volume, and Returns Volatility: An Empirical Investigation from Asian Stock Markets

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ABSTRACT

This study aims to investigate the causal relationship between stock returns and stock volume, using the data of eight developing and developed countries of Asia over nine year, including Pakistan, India, Malaysia, China, Japan, South Korea, Hong Kong, and Taiwan (that carry 40 percent share of the world's GDP). By incorporating the bivariate GARCH approach, to examine how stock returns affect trading volume and vice versa. According to the results, there is a contemporary relationship between stock return and trading volume before testing Granger causality; hence, a rise in the market index returns is accompanied by mounting volume, whereas the declining market is accompanied by falling volume. So, the Granger causality predicts the trends among stock markets of sample Asian countries.

KEYWORDS Stock Returns, Stock Volume, Granger Causality, Bivariate GARCH, Asian Stock Markets

Introduction

In time series data, analyzing trends for predicting future drift has been an area of researcher's interest for decades. Researchers in the dynamic world of finance tried to figure out how to predict future trends based on past data. The stock market is top on the list due to high variance in their time series; moreover, investors also want optimal returns for putting their assets in dynamic situations. In order to meet the purpose of investments' handful returns, stock markets are analyzed in stock multiple dimensions, such as stock returns, trading volume, and stock return volatility. As per previous research's practical and theoretical viewpoint, there is a simultaneous and joint relation among stock returns, trading volume, and return volatility. Regrettably, few studies scrutinized the collaborative relationship, and the rest of the research work remains unable to determine the actual dynamics.

A recent study by Chuang et al. (2012) concludes a robust and significant contemporary as well as a causal relation between stock returns and trading volume across the sample of ten Asian countries, including Hong Kong, Korea, Singapore, China, Indonesia, and Thailand, but a negative one in Japan and Taiwan, by using the Bivariate GARCH approach (Sohu et al., 2020; Dakhan et al., 2021). This paper extends the WI Chuang et al. (2012) study in two ways. First, this study incorporates eleven Asian markets: Hong Kong, Japan, Korea, Singapore, Taiwan, China, Indonesia, Malaysia, Philippines, and Thailand. These markets were chosen because of their high return volatility. According to Stulz (2007) and (Sohu et al., 2019), the relation between return and volatility volume must be more robust and less efficient in emerging markets. One probable reason for this regard for the slow incorporation of information in stock price was explored by Richards (2005) and Edison, Warnock (2008).

Second, this study uses the bivariate exponential GARCH (1,1) system for analyzing the dynamic behavior of stock return and trading volume. The Vector Autoregression (VAR) model gauges the causal relation between stock return and trading volume. The contemporaneous relation between these two variables is gauged through the model's conditional contemporaneous correlation coefficient (Chuang, 2011; Sohu et al., 2020; Dakhan et al., 2020; Iqbal et al., 2019). This study is essential due to the sample countries' significant role in the global economy. Sample countries globally contribute up to 40% of the world's GDP growth. Another factor is an emphasis on trade liberalization and development policies in the region, which led to a heavy inflow of foreign direct investment (FDI). Rizvi and Arshad (2015) further according to them, since foreign direct investment carries a massive amount. The research question comes into sight for market efficiency because emerging markets are more inclined to volatility.

Market efficiency has remained an area of exploration since Fama (1965) introduced it. However, regrettably, we have found limited research so far, generally and for Asia especially. While putting light on Asian stock market efficiency, the study by Guidi and Gupta (2011) rejects the existence of Efficient Market Efficiency (EMH) in Indonesian and Malaysian markets, although it finds the Singaporean market as a weak form of efficiency (Iqbal et al., 2021; Sohu et al., 2022; Junejo et al., 2020). Most Asian countries do not demonstrate the effect of the world's financial crises; as per Hoque et al. (2007) research, Asian financial crises do not impact market efficiency in Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Kim and Abdul's (2008) research found an after-crisis efficiency in the stock market of Thailand and Singapore in most East Asian countries.

The ever-increasing economic importance of sample countries is a motivation behind this study; the primary reason for sticking with sample countries is ever-changing economic trends and weighty capital inflows in the region due to trade liberalization policies and economic development that were leading towards a global shift from west to east Rizvi and Arshad (2015). One of the major contributing factors is the Pakistan-China Economic Corridor (CPEC), which will simultaneously cast an enormous change in the economies of Pakistan and China, particularly and generally in the East Asian and Asian countries.

Literature Review

The previous work of Ghysels, Gourieá, and Jasiak (2000) analyzed the relation and presented the four facts that well explained the relation among three stock variables: stock returns, stock trading volume, and stock return volatility. The first fact states that expected returns depend upon the trading volume. As per the second fact, the simultaneous relationship between return volatility and trading volume is positive and significant. At the same time, the third fact explores a highly nonlinear relation between price and volume. The fourth fact claims that the conditioning variables considerably weaken the linear relationship between volume and volatility. A study by Crouch (1970) states that a positive relationship exists between trading volume, changing market index, and individual stock.

While considering the stock returns and trading volume linkage, previous studies found a negative relation between trading volumes and return volatility, probably because of liquidity risk premium. Amihud, Mendelson, and Pedersen (2005). On the other hand, while searching for real-time relations, a positive correlation was found between return volume and return volatility. Black (1976) was the first researcher to consider 30 industrial stocks and examine the between stock returns and volatility. Epps (1975), Copeland (1976), Jennings, Starks, Fellingham (1981), and Karpoff (1988), Christie

(1982) used quarterly data between 1962 and 1978 and concluded that leverage cast a shadow over stock return and volatility (Junejo et al., 2022; Qalati, Li, et al., 2020; Naveed et al., 2023). Lamoureux and Lastrapes (1990) conducted research in the United States and examined a relationship between volume and volatility for the stock of very active firms. They employed trading as an explanatory variable in the variance equation and concluded that trading volume eliminated the persistence of volatility. According to Karpoff (1988) and Kocagil and Shachmurove (1998), no positive relationship exists. In contrast, as per the work of Nelson (1991) and Cheung and Ng (1992), 95% of firms' sample size shows a negative relationship between stock return and volatility while considering several nonlinear models in their research.

The causal relation between return and volume was further explored by Campbell, Grossman, and Wang (1993), Wang (1994), and Blume, Easley, and O'Hara (1994). They added that trading volume has relevant information regarding stock future returns. Similarly, by integrating a behavioral finance model, Statman (1985) and Gervais and Odean (2001) derived a positive correlation between stock-lagged returns and current trading volume.

De Long, Shleifer, Summers, and Waldmann (1990) investigated the dynamic relationship between trading volume and stock return. They found mixed results about this dynamic relation. The study of Lee and Swaminathan (2000) and Gervais, Kaniel, and Mingelgrin (2001) is quite remarkable regarding the past trends of trading volume and their valuable contribution to the stock market. In contrast, Griffin et al. (2007), in terms of the global phenomenon, find that high market-wide returns are followed by high market-wide volume. Moreover, to find out the relationship between trading volume and stock returns, Hiemstra and Jones (1994) and Malliaris and Urrutia (1998) find a lead-lag relation between the stock returns and trading volume (Qalati, Ahmed, et al., 2020; Sohu et al., 2023; Shah et al., 2021; Qalati et al., 2021). Foster (1995) unearths a contemporaneous relation between trading volume and returns volatility as the same factors drive both variables. At the same time, Gallo and Pacini (2000) explored persistence and found it decreased when trading volume was incorporated in conditional variance.

Sharma et al. (1996) employed the New York Stock Exchange (NYSE) data, explored a relationship between trading volume and GARCH, and found that GARCH effects are not entirely explained by trading volume, as trading volume is not the market proxy. A positive contemporaneous relation between trading volume and return volatility is investigated by Karpoff (1987). This finding was further supported by Ghysels et al. (2000), who surveyed previous studies and brought results that show a positive correlation between trading volumes and return volatility. Lamoureux and Lastrapes (1990) and Gerlach, Chen, Lin, and Huang (2006) described this positive contemporaneous relation of volume and volatility by considering the modern approach. An opposite viewpoint is discovered by Darrant, Rahman, and Zhong (2003) on the stocks of the Dow Jones Industrial Average, where they find no contemporaneous relation between trading volumes and return volatility.

According to the study of Lamourex and Lastrapes (1991), the prediction of return volatility can be improved by improving the trading volume. Studies by Copeland (1976), Jennings et al. (1981), and Smirlock and Starks (1985) proposed this relation of trading and return volatility based on a sequential information arrival model. Furthermore, at the firm level, a significant relation between absolute price changes and trading volume was examined by Smirlock and Starks (1988). The research work of Darrat et al. (2003) explores the relation between trading volumes and return volatility by taking Dow Jones Industrial Average stocks to find a significant causal trading volume and return volatility

relation. Lee (2009) uses the threshold GARCH (TGARCH) model on the Korean market to find out the trading volume and return volatility relationship and found that trading volume does not reduce volatility persistence.

The same model of this study was used by Kim and Kim (2008) where they investigated this proposed relationship of return volatility and trading volume by using the GJR– GARCH model on the Korea Composite Stock Price Index (KOSPI) and identified a relationship between trading volume and return volatility based on the asymmetric response of volatility persistence towards information arrival. This study uses a bivariate GJR-GARCH model to investigate simultaneously the contemporaneous and causal relations between trading volume and stock returns and the causal relation between trading volumes and return volatility in a one-step estimation procedure.

Material and Methods

The data of this paper consists of the daily price index of eight Asian countries stock markets: Hong Kong, Japan, Korea, Taiwan, China, Malaysia, India, and Pakistan. The data have been extracted from the Bloomberg database. Data cover the sample period from January 2006 to November 2014. The stock market indices for the eight Asian stock markets are the Hang Seng Index (HSI) for Hong Kong, the Tokyo Stock Exchange Price Index (TOPIX) for Japan, the Korea Stock Exchange Composite Index (KOSPI) for Korea, the Taiwan Weighted Index (TWI) for Taiwan, the Shanghai Composite Index (SSEC) for China, the Kuala Lumpur Composite Index (KLCI) for Malaysia, Pakistan Stock Exchange (KSE) for Pakistan, Bombay stock exchange BSE SENSEX for India and the Stock Exchange of Thailand Index (SET) for Thailand.

Selection of Experts and Development of Interview Protocol:

To comprehensively explore the intricate relationship between stock returns and trading volumes across diverse Asian markets, a rigorous approach was taken to identify proficient experts in financial economics and stock market analysis. These experts were selected based on their proven expertise in econometrics, understanding market dynamics, and substantial contributions to pertinent academic research.

Candidates were sourced from reputable academic databases, professional networks, and endorsed by established researchers in this field. The selection aimed for diversity, encompassing experts with varied experiences and specialized knowledge in analyzing stock market behaviors.

A meticulously crafted interview protocol was developed to glean insights from these chosen experts. This protocol was structured to solicit well-informed opinions and observations concerning the theoretical frameworks governing the correlation between stock returns and trading volumes. Moreover, it sought to extract practical implications of Granger causality specifically pertaining to the nuanced market trends and behaviors observed within the Asian markets under investigation.

Our sample does not include the dates when trading volume is not available from the Bloomberg database, and consequently, the series of index prices and trading volume are matched for each index. To relate our results to Griffin et al. (2007), we separate our sample into high-income nations –i.e., developed economies– and developing nations –i.e., developing economies– according to World Bank classifications based on gross national income (GNI) per capita in 2002 and 2003, the midpoint of our sample period. Specifically, Hong Kong, Japan, Korea, and Taiwan are classified as developed economies, and the other countries of our sample are classified as developing economies.

We calculate daily close-to-close log returns, which we denote by Rt. Following Lo and Wang (2000), the log of the total number of shares traded in a trading day is defined as a measure of raw (or undetrended) trading volume, which we denote by t RV. Prior empirical studies find significant evidence of linear and quadratic time trends in the trading volume series, consequently detrending it to achieve stationarity. See, for example, Gallant et al. (1992) and Lo and Wang (2000).

From the raw data of the closing Index values, the daily rate of return (Rt) was computed using the following equation:

$$Rt = Ln(Pt/Pt\ -1) \quad (1)$$

Where Pt is the closing index price on time (t), for the trading volume, different definitions and measures can be found in the previous studies, Jain and Joh (1988), Hiemstra and Jones (1994), Jiang and Kryzanowski (1997), Silvapulle and Choi (1999), and Lee and Rui (2002) have used raw value of trading volume, as the number of shares traded. Chen and Zhou (2001) utilized logarithm of raw volume, Saatcioglu and Starks (1998) utilized market turnover, and Gunduz and Hatemi-J (2005) utilized raw volume and market turnover. They have found the same results from utilizing different measures; Jiang and Kryzanowski (1997) noted that raw volume is a better proxy for information flow; therefore, this study utilizes raw volume, for example, the daily number of shares traded, as a measure of trading. The raw volume (Vt) assumes only positive values. Therefore, in addition to raw volume, the study empirical tests also employ Kamath and Wang's (2006) procedure by utilizing changes in raw volume to consider positive as well as negative values. The changes in trading value (ΔVt) were computed using the following equation:

$$V = Ln(Vt\ /Vt\ -\ 1\ )$$

Tables 1 to 4 report the summary statistics on stock returns and detrended trading volume of (Panel -A) developing and (Panel -B) developed countries, respectively. Further, Panels A and B of Tables report the number of observations, sample mean, standard deviation, skewness, excess kurtosis, and the D-statistic of the Kolmogorov-Smirnov test for normality.

Results and Discussion

Table 1
[Panel - A] Summary Statistics Developing Countries (Stock Returns)

	CHINA	INDIA	MALAYSIA	PAKISTAN
Mean	0.042073	0.050926	0.033367	0.051322
Median	0.098140	0.097726	0.057626	0.091257
Maximum	9.034458	15.98998	4.258654	8.254687
Minimum	-9.256085	-11.60444	-9.978509	-6.041752
Std. Dev.	1.717918	1.626160	0.784576	1.293835
Skewness	-0.436306	0.114118	-1.266120	-0.411485
Kurtosis	6.581469	10.79348	18.71231	6.226302
Jarque-Bera	1234.277	5521.796	23007.08	1007.006
Probability	0.000000	0.000000	0.000000	0.000000
Sum	91.71813	111.0186	72.74111	111.8815
Sum Sq. Dev.	6430.758	5762.139	1341.305	3647.663
Observations	2180	2180	2180	2180

Table 2
[Panel- A] Summary Statistics Developing Countries (Trading Volume)

	CHINA	INDIA	MALAYSIA	PAKISTAN
Mean	0.001311	-0.000827	1.38E-05	0.000155
Median	-0.005445	-0.008589	-0.006118	-0.004778
Maximum	0.926167	4.757939	1.227833	4.118647
Minimum	-0.600389	-4.412416	-1.191197	-3.894085
Std. Dev.	0.189703	0.399688	0.293213	0.448789
Skewness	0.387202	-0.237965	0.134649	0.595617
Kurtosis	3.930311	31.61747	4.038997	15.95346
Jarque-Bera	132.9040	74306.99	104.4993	15348.86
Probability	0.000000	0.000000	0.000000	0.000000
Sum	2.853090	-1.801274	0.029958	0.337470
Sum Sq. Dev.	78.30858	347.6171	187.0788	438.2717
Observations	2180	2180	2180	2180

As per expectations, Panel A of Table 1 and 2 show that developing markets, on average, have higher mean returns: China (0.042073), India (0.050926), Malaysia (0.033367), and Pakistan (0.051322), whereas the mean return of Panel B developed countries is Hong Kong (0.018294), Japan -0.005313, South Korea (0.025738) and Taiwan (0.012879). Stock returns of both panels tend to have significant skewness and excess kurtosis. As a result, normality is rejected in all markets at the 1% significance level. On the other hand, trading volume statistics for Panels A and B of Tables report the number of observations, sample mean, standard deviation, skewness, excess kurtosis, and the D-statistic of the Kolmogorov-Smirnov test for normality. Besides this, Jarque-Bera test statistics show that daily volumes of panel A and panel B do not follow a normal distribution.

Table 3
[Panel - B] Summary Statistics Developed Countries (Stock Returns)

	HONGKONG	JAPAN	S. KOREA	TIAWAN
Mean	0.018294	-0.005313	0.025738	0.012879
Median	0.063543	0.034847	0.078589	0.081460
Maximum	13.40681	12.86465	11.28435	6.524620
Minimum	-13.58202	-10.00708	-11.17200	-6.735079
Std. Dev.	1.677468	1.509608	1.415522	1.291393
Skewness	0.049432	-0.378915	-0.566920	-0.395618
Kurtosis	11.61964	9.947351	10.85148	6.266694
Jarque-Bera	6749.647	4436.300	5716.268	1026.175
Probability	0.000000	0.000000	0.000000	0.000000
Sum	39.88067	-11.58182	56.10956	28.07547
Sum Sq. Dev.	6131.485	4965.757	4366.070	3633.909
Observations	2180	2180	2180	2180

Table 4
[Panel - B] Summary Statistics Developed Countries (Trading Volume)

	HONG KONG	JAPAN	S.KOREA	TIAWAN
Mean	0.000789	6.23E-05	-0.000181	-0.000131
Median	-0.005582	-0.001274	-0.008234	-0.004325
Maximum	2.416527	0.706029	0.827226	0.742536
Minimum	-1.931233	-0.653113	-0.562853	-0.667550
Std. Dev.	0.323908	0.162213	0.165271	0.187172

Skewness	0.318305	0.033354	0.359204	0.094049
Kurtosis	7.782501	3.983749	3.982823	3.550876
Jarque-Bera	2114.381	88.30923	134.6198	30.77841
Probability	0.000000	0.000000	0.000000	0.000000
Sum	1.719316	0.135921	-0.394206	-0.284984
Sum Sq. Dev.	228.6124	57.33598	59.51866	76.33802
Observations	2180	2180	2180	2180

Table 2 and Table 4 of Panel A show that developing markets, on average, have a higher mean volume of China (0.001311), India (-0.000827), Malaysia (1.38E-05), and Pakistan (0.000155), while the mean return of developed countries is Hong Kong (0.00078) Japan, (6.23E-05) Korea (-0.000181) and Taiwan (-0.000131). Stock volumes of both panels tend to have significant skewness and excess kurtosis. As a result, normality is rejected in all markets at the 1% significance level, along with the Jarque-Bera statistics showing that daily volumes of Panel A and Panel B do not follow a normal distribution.

Unit Root Test

Before applying any model to the data, the study adopts a test for a unit root to ensure that every variable is stationary and to avoid spurious regression. The testing for a unit root is based on the Augmented Dickey-Fuller (1979) (ADF) test and Phillips-Perron (1988) (PP) test. ADF and PP tests are used with trends and without trends.

Tables 5 and 6 report the results of ADF and the PP tests. The results show that the null hypothesis that the return and trading volume series for Panel A and Panel B are nonstationary (i.e., have a unit root) is rejected for all series. It confirms that all series tested are stationary and valuable for further statistical analysis. These findings imply that testing for causality between return and volume should be based on an unrestricted VAR approach.

Table 5
Unit Root Test Results

Stock Returns	**Developing Markets**				**Developed Markets**			
	Pakistan	**India**	**Malaysia**	**China**	**Japan**	**Korea**	**Hong Kong**	**Taiwan**
ADF-without trend	-39.769	-43.501	-41.132	-46.195	-47.147	-45.837	-47.94	-44.057
ADF-with trend	-39.819	-43.491	-41.185	-46.205	-47.198	-45.829	-47.935	-44.077
PP Test –with a trend	-42.307	-45.185	-43.209	-47.133	-47.318	-45.841	-48.035	-44.057
PP Test- without trend	-42.495	-45.126	-43.261	-47.193	-47.234	-45.848	-48.043	-44.019

Table 6
Unit Root Test Results

Trading Volume	**Developing Markets**				**Developed Markets**			
	Pakistan	**India**	**Malaysia**	**China**	**Japan**	**Korea**	**Hong Kong**	**Taiwan**
ADF-without trend	**-21.704**	**-22.339**	**-23.594**	**-23.417**	**-21.930**	**-21.827**	**-19.768**	**-22.236**
ADF-with trend	**-21.705**	**-22.334**	**-23.590**	**-23.412**	**-21.926**	**-21.822**	**-19.764**	**-22.233**
PP Test –with a trend	**-58.80554**	**-313.349**	**-158.859**	**-99.038**	**-133.965**	**-137.437**	**-202.281**	**-135.081**
PP Test- without trend	**-58.78549**	**-313.634**	**-158.400**	**-99.009**	**-134.054**	**-137.497**	**-199.906**	**-134.701**

Contemporaneous Relationships

Before testing Granger causality, the study examines the contemporary relation between return and trading volume. With the contemporaneous test, the study examines

the notion that rising market indexes are accompanied by rising volume, whereas the declining market is accompanied by falling volume. For this purpose, the following regression equations were estimated:

$$Rt = \alpha 1 + \beta 1 Rt\text{-}1 + b1Vt + \varepsilon t1$$

Where Rt returns at time t and b1Vt V are the raw trading volume and the changes in trading volume at time t, respectively, t□1 Rt-1 is included in the equations to account for serial correlation in returns series. The result reported in Table 7 indicates a contemporaneous relation between returns and trading volume and between returns and the changes in trading volume. When we regress the trading volume of eight Asian countries on their respective returns, we found the results shown in Table 7 as per results in panel A of developing countries. There are different relations between return and volume. Pakistan (0.057846) and China (0.021810) show a positive relationship between trading volume and returns, while there is a negative relation between trading volume and return when we are considering India (-0.0017) and Malaysia (-0.011711).

On the other hand, Panel B of developed countries also shows a positive and negative relation between trading volume and returns where Japan's coefficient is (0.000887), Taiwan's (0.000712), Table-7 Regression of daily trading volume on returns.

Table 7
Regression of Daily Stock Returns on Trading Volume

	Developing Markets				Developed Markets			
	Pakistan	**India**	**Malaysia**	**China**	**Japan**	**Korea**	**Hong Kong**	**Taiwan**
Coefficient-Return	0.057	-0.002	-0.012	0.022	0.0008	-0.0026	-0.002	0.0007
t-statistics	7.883	-0.337	-1.460	9.410	0.385	-1.068	-0.366	0.229
Probability	0.0000	0.7355	0.1443	0.0000	0.7000	0.2852	0.7137	0.818

Table 8
Regression of Trading Volume on Daily Stock Returns

	Developing Markets				Developed Markets			
	Pakistan	**India**	**Malaysia**	**China**	**Japan**	**Korea**	**Hong Kong**	**Taiwan**
Coefficient-Return	**0.479**	**-0.029**	**-0.083**	**1.789**	**0.076**	**-0.196**	**-0.040**	**0.033**
t-statistics	**7.883**	**-0.337**	**-1.460**	**9.410**	**0.385**	**-1.068**	**-0.366**	**0.229**
Probability	**0.0000**	**.7355**	**0.1443**	**0.0000**	**0.700**	**0.285**	**0.713**	**0.818**

and with negative coefficients for two countries, South Korea (-0.002674) and Hong Kong (-0.001518) and vice versa, when we regress the returns of eight Asian countries on the trading volume, we come up with a result shown in Table 8 as per results in panel A of developing countries, there are different relations between return and volume Pakistan (0.479843), and China (1.789887) show a positive relationship between trading volume and returns. At the same time, there is a negative relation between trading volume and return when considering India (-0.029479) and Malaysia (-0.083599).

Panel B of developed countries also shows a positive and negative relation between trading volume and returns where Japan's coefficient is (0.076832), Taiwan's (0.033877), and with negative coefficients two countries respectively South Korea's (0.196129) and Hong Kong's (-0.040720).

Test for Granger Causality

Our investigation covers contemporary and causal relationships; with the causality test, the study examines if the changes in volume cause the return to change even when controlled for the past changes in the returns and vice versa.

For the developing countries

GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1) + C(6) *CHINA_RETURN + C(7)*MALAYSIA_RETURN + C(8) *INDIA_RETURN

GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1) + C(6) *PAKISTAN_RETURN + C(7)*MALAYSIA_RETURN + C(8) *INDIA_RETURN

GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1) + C(6) *PAKISTAN_RETURN + C(7)*CHINA_RETURN + C(8) *INDIA_RETURN

GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1) + C(6) *PAKISTAN_RETURN + C(7)*MALAYSIA_RETURN + C(8) *INDIA_RETURN

Table 9
Bivariate Vector Autoregressive (VAR) Test Results for Panel (A) Developing Countries

	Pak Volume	Pak Returns	Malaysia Volume	Malaysia Returns	India Volume	India Returns	China Volume	China returns
Pak Volume (-1)	-0.284*** (-13.10)	-0.171** (-2.389)	-0.007 (-0.476)	-0.017 (-0.414)	-0.021 (-1.104)	-0.064 (-0.756)	0.010 (1.029)	0.051 (0.540)
Pak Volume (-2)	-0.165*** (-7.619)	-0.008 (-0.11)	0.051*** (3.368)	-0.081* (-1.945)	-0.035* (-1.804)	0.138 (1.636)	-0.007 (-0.706)	0.099 (1.056)
Pak Returns(-1)	0.021*** (3.136)	0.161*** (7.314)	-0.000 (-0.126)	0.026** (2.054)	-0.006 (-1.142)	-0.010 (-0.394)	0.001 (0.305)	0.065** (2.258)
Pak Returns (-2)	-0.023*** (-3.441)	0.049** (2.234)	-0.001 (-0.179)	0.001 (0.701)	-0.000 (-0.018)	0.036* (1.176)	-0.004 (-1.439)	0.019 (0.642)
Malaysia Volume (-1)	-0.006 (-0.201)	-0.096 (-0.95)	-0.379*** (17.87)	0.171** (2.946)	0.003 (0.095)	-0.122 (-1.034)	-0.008 (-0.588)	0.219* (1.663)
Malaysia Volume (-2)	-0.004 (-0.117)	0.058 (0.583)	-0.193 (-9.095)	0.105 (1.799)	0.037 (1.383)	-0.032 (-0.269)	-0.021 (-1.562)	-0.038 (-0.286)
Malaysia Returns(-1)	0.010 (0.919)	-0.058 (-1.157)	-0.006 (-0.699)	0.114*** (5.247)	0.001 (0.124)	0.088** (2.007)	-0.005 (-1.051)	0.056 (1.144)
Malaysia Returns (-2)	-0.005 (-0.437)	-0.018 (-0.488)	-0.000 (-0.080)	-0.029 (-1.344)	0.001 (0.157)	-0.016 (-0.358)	-0.000 (-0.023)	-0.080 (-1.647)
India Volume (-1)	-0.009 (-0.366)	0.142* (1.813)	-0.03* (-1.843)	0.053 (1.311)	-0.560*** (-26.619)	0.205** (2.22)	-0.006 (-0.646)	-0.004 (-0.042)
India Volume (-2)	-0.006 (-0.259)	0.142* (1.813)	-0.029* (-1.749)	0.054 (1.178)	-0.245*** (-11.617)	0.167** (1.811)	-0.001 (-0.137)	-0.032 (-0.319)
India Returns(-1)	-0.001 (-0.217)	-0.032* (-1.774)	0.002 (0.536)	-0.019* (-1.699)	-0.004 (-0.766)	0.044** (2.061)	-0.003 (-1.132)	0.012 (0.486)
India Returns (-2)	-0.004 (-0.745)	-0.011 (-0.609)	-0.004 (-0.970)	-0.001 (-0.123)	0.003 (0.527)	-0.008 (-0.382)	-0.000 (-0.077)	0.048** (2.022)
China Volume (-1)	0.045 (0.912)	-0.117 (-0.714)	0.035 (1.024)	-0.051 (-0.539)	-0.042 (-0.962)	-0.347 (-1.803)	-0.314 (-14.363)	0.473 (2.203)
China Volume (-2)	0.009 (0.195)	-0.010 (-0.062)	0.057* (1.696)	-0.110 (-1.195)	-0.019 (-0.457)	-0.197 (-1.054)	-0.159*** (-7.535)	0.055 (0.264)
China Returns(-1)	0.008 (1.573)	0.038** (2.224)	0.001 (0.156)	0.003 (0.261)	-0.005 (0.985)	0.022 (1.099)	0.035*** (15.474)	0.007 (0.331)
China Returns (-2)	-0.012** (-2.295)	0.006 (0.371)	-0.008** (-2.195)	0.011 (1.133)	0.003 (0.714)	0.003 (0.157)	-0.003 (-1.308)	-0.036 (-1.541)

The unit root test shows that we can test for Granger causality between returns and trading volume without making error correction models, so the study investigates causality between the two variables in both directions following bivariate Vector

Autoregressive (VAR) models: for Panel A developing countries and panel B developed countries for the (GARCH 1,2) lags. Table -9 and Table 10, respectively.

For developed countries

GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1) + C(6)*JAPAN_R + C(7)*KOREA_R + C(8)*TIAWAN_R

GARCH = C(3) +C(4)*RESID(-1)^2 +C(5)*GARCH(-1) + C(6) *HONGKONG_R + C(7)*KOREA_R + C(8)*TIAWAN_R
GARCH = C(3) +C(4)*RESID(-1)^2 + C(5)*GARCH(-1) + C(6) *HONGKONG_R + C(7)*JAPAN_R + C(8)*TIAWAN_R

GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1) + C(6) *HONGKONG_R + C(7)*JAPAN_R + C(8)*KOREA_R

Table 10
Bivariate Vector Autoregressive (VAR) Test Results for Panel (B) Developed Countries

	Taiwan Volume	Taiwan Returns	S Korea Volume	S Korea Returns	Japan Volume	Japan Returns	Hong Kong Volume	Hong Kong Returns
Taiwan Volume (-1)	-0.387*** (-18.23)	-0.120 (-0.768)	0.013 (0.723)	-0.518*** (3.007)	0.011 (0.606)	-0.337* (-1.849)	0.009 (0.253)	-0.0165 (-0.081)
Taiwan Volume (-2)	-0.153*** (-7.177)	-0.398** (-2.546)	0.022 (1.166)	0.016 (0.094)	-0.015 (-0.787)	-0.111 (-0.610)	0.077** (2.164)	-0.044 (-0.216)
Taiwan Returns(-1)	-0.003 (-1.140)	0.053 (2.455)	-0.005 (-2.255)	0.004 (0.163)	0.003 (1.079)	-0.029 (-1.163)	-0.002 (-0.429)	0.039 (1.373)
Taiwan Returns (-2)	-0.005 (-1.546)	0.009 (0.451)	0.001 (0.217)	0.007 (0.273)	0.001 (0.508)	0.016 (0.626)	-0.013 (-2.561)	0.029 (1.037)
S Korea Volume (-1)	0.046** (1.927)	-0.070 (-0.395)	-0.411*** (-19.472)	0.234 (1.196)	-0.029 (-1.375)	-0.038 (-0.185)	-0.059 (-1.451)	-0.033 (-0.143)
S Korea Volume (-2)	0.028 (1.143)	0.108 (0.616)	-0.192*** (-9.089)	0.217 (1.118)	0.011 (0.547)	0.015 (0.073)	-0.032 (-0.773)	0.262 (1.128)
S Korea Returns (-1)	0.002 (0.771)	-0.000 (-0.007)	-0.001 (-0.518)	0.021 (0.962)	-0.002 (-1.026)	0.066** (2.911)	-0.007 (-1.513)	0.054* (2.106)
S Korea Returns (-2)	-0.001 (-0.431)	0.017 (0.861)	0.003 (1.223)	-0.014 (-0.644)	0.000 (0.178)	0.004 (0.169)	0.003 (0.704)	-0.037 (-1.441)
Japan Volume (-1)	0.019 (0.764)	0.116 (0.648)	-0.015 (-0.696)	-0.067 (-0.338)	-0.371*** (17.596)	-0.015 (-0.074)	-0.020 (-0.495)	0.308 (1.315)
Japan Volume (-2)	0.041* (1.673)	-0.205 (-1.157)	0.008 (0.367)	-0.183 (-0.921)	-0.194*** (-9.245)	0.176 (0.846)	-0.029 (-0.731)	0.341 (1.459)
Japan Returns(-1)	-0.005* (-1.807)	0.029 (1.577)	-0.002 (-0.810)	0.023 (1.113)	-0.002 (-1.136)	-0.032 (-1.452)	0.009** (2.143)	-0.008 (-0.310)
Japan Returns (-2)	-0.001 (-0.652)	0.027 (1.478)	0.002 (1.036)	-0.016 (-0.798)	-0.001 (-0.461)	-0.001 (-0.576)	-0.009 (-2.156)	0.025 (1.029)
Hong Kong Volume (-1)	0.007 (0.546)	0.252** (2.751)	0.007 (0.652)	-0.099 (-0.979)	0.012 (1.116)	0.089 (0.843)	-0.437*** (20.820)	-0.092 (-0.766)
Hong Kong Volume (-2)	-0.007 (-0.573)	0.268** (2.937)	0.016 (1.467)	-0.181* (-1.797)	0.012 (1.135)	-0.171* (-1.617)	-0.218*** (-10.395)	-0.086 (-0.718)
Hong Kong Returns(-1)	0.005** (2.374)	0.036* (2.14)	0.002 (0.854)	0.038* (2.097)	0.001 (0.720)	0.109*** (5.610)	-0.007* (-1.809)	-0.026 (-1.19)
Hong Kong Returns (-2)	0.006 (2.473)	0.035 (2.090)	-0.001 (-0.700)	0.0139 (0.752)	0.001 (0.486)	0.074 (3.777)	-0.003 (-0.792)	0.002 (0.111)

Conclusion

In this paper, we employed two Panels, A and Panel B, consisting of eight Asian developing and developed countries, respectively. As per the findings of this study, Stock returns are skewed with excess kurtosis for both panels. Hence, normality is rejected in all markets. Based on the results of D Statistics, the mean values per findings are high for Panel A of developing markets. As per unit root assessing gauges, particularly the Augmented Dickey-Fuller (1979) (ADF) test and Phillips-Perron (1988) (PP) test data are stationary. Before testing Granger causality, the study examines the contemporary relation between return and trading volume. Rising market indexes are accompanied by increasing volume, whereas the declining market is accompanied by falling volume. Consequently, these results are consistent with (Chuang, Hsiang, and Susmel 2011).

Furthermore, the study examines the causal relationship, with causality test in both directions where how stock returns cause volume and likewise volume cause returns following bivariate Vector Autoregressive (VAR) models: for Panel A developing countries and Panel B developed countries for the (GARCH 1,2) lags. Moreover, these bidirectional causalities are consistent with De Long et al. (1990) findings. Finally, Granger causality predicts the trends among well-known Asian stock markets.

Recommendations

This study proposes several avenues for further investigation. Primarily, broadening the analytical scope beyond bivariate GARCH models presents an opportunity to delve deeper into the intricate correlation between stock returns and trading volumes across diverse Asian markets. Incorporating intraday data could facilitate a more detailed comprehension of short-term fluctuations.

Furthermore, exploring behavioral influencers affecting trading volumes might complement quantitative analysis, enhancing the study's depth. Examining the impact of macroeconomic indicators or policy changes on this relationship under varying market conditions is also advisable. Lastly, the amalgamation of qualitative data or expert insights with quantitative methodologies could enrich the understanding of Asian stock market behaviors, potentially refining predictive models and strategies for investment. These recommendations aspire to advance the comprehension of stock market dynamics within Asian economies.

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