



## VALUING INTEGRATION IN ASIAN STOCK MARKETS: A COMPARATIVE STUDY OF PRE AND POST-COVID-19 PERIODS

DR. MUHAMMAD RIZWAN KAMRAN<sup>1</sup>, LUBNA NASAR<sup>2</sup>, SAIMA KHURSHID<sup>3</sup>, AISHA SALEEM<sup>4</sup>  
**ABSTRACT**

Lately, the epidemic different the whole set-up of worldwide employment and cross-capital movement. Coronavirus caused unlimited fluctuations across the world. Research focuses on exploring the influence of covid-19 happening the global associations of the Pakistan ordinary market with additional nations now shortage. From standpoint, aforementioned adjustment elucidates the prospective influence of the COVID-19 epidemic on the immediate and prolonged financial integration among six growing Asian economies, namely Pakistan, Japan, China, India, Indonesia, and Malaysia. The daily closing indices of several countries were assessed for the period spanning from January 2017 to December 2022. Pre-covid-19 periods (January 1, 2017, to December 2019, and Post-covid-19 periods (from January 1, 2020)) and Post-covid-19 periods make up the two groups of the entire study period. Logarithmic exchange-traded returns were calculated for the Karachi Stock Exchange (KSE), Shanghai Stock Exchange (SSE), Tokyo Stock Exchange (TSE), Bombay Stock Exchange (BSE), Jakarta Stock Exchange (JSE), and Bursa Stock Exchange (FTSE). By expending the Johansen co-integration and Granger causality tests, respectively, the integration among the chosen economies was studied for both long- and short-run integration. The study answers the question, to what extent do the chosen stock markets exhibit long-run co-integration? If so, please tell me whether or if COVID-19 has affected it. Is there a short-term unidirectional or bidirectional causal relationship between these markets? If so, please tell me whether or if COVID-19 has affected it.

**KEYWORDS:** COVID-19, The Emerging Asian Nations, Financial Integration, Stock Markets

### 1. INTRODUCTION

An outbreak, a newly discovered coronavirus infection (COVID-19) that was earliest described in December 2019 in Wuhan, China, is speedily spreading through the globe. Travel bans, social isolation mandates, and the closure of schools, bars, restaurants, and other businesses are just some of the drastic processes governments took to contain the new virus. Concerns about demand collapse increased uncertainty, and supply chain disruption is at the top of companies' lists as Covid-19 spreads worldwide in the first quarter of 2020.

Commercial and financial ties primarily influence international stock market integration. Investing across borders is now easier than ever. Since the benefits of portfolio diversification have diminished due to established nations' high degree of integration, investors have shifted their focus to emerging markets. There is a lot of curiosity surrounding research on how interconnected global stock markets are. Using cutting-edge methods, academics from all across the world have examined how well markets work together. Commercial exchanges essentially facilitate Pakistan's ties to foreign nations. (Joyo & Lefen, 2019). (Wagner,2020) Expectations of Investors for The Future. The stock market provides a view of what investors expect for the future. Expectations of Investors for The Future

Apart from a few rising markets in Africa and Latin America, Pakistan's stock market remains one of the smallest in the world. Scholars, policymakers, and investors have all paid close attention to the properties of a crisis arranged stock market returns and volatility, as well as the subsequent contagion caused by the spread of information across local and international markets. When financial problems occur, market volatility and related spillovers tend to spike. At COVID-19, a similar occurrence has been confirmed. In addition, stock market indices have dropped significantly (Aslam et, al2022).

The global spread of COVID-19 was rapid, profoundly affecting monetary markets in nearly every country. Its rapid proliferation caused disorder in the market, and risk-averse depositors lost a great deal of currency. This article aims to test the outcome of COVID-19 on stock markets in the topmost six suffering states, as measured by total number of confirmed cases. The needs created the aberrant returns. The virus also examined the volatility brought on by Use event study methods to analyze the most unstable occasion times about daily increase in Covid-19 cases and market profits

<sup>1</sup> Assistant Professor, Government College University Faisalabad, Pakistan

<sup>2</sup> PhD Scholar, Government College University Faisalabad, Pakistan

<sup>3</sup> PhD Scholar, Government College University Faisalabad, Pakistan

<sup>4</sup> Corresponding Author, Lecturer, Government College University Faisalabad, Pakistan

during these intervals. The consequence of the COVID-19 pandemic on stock markets. markets can be seen in the increased instability and the significant irregular earnings amongst the model indexes. According to data, Brazilian market indexes experienced the worst decline (almost 50%) among the chosen nations through the pandemic. In comparison, the Mexican stock index experienced the smallest drop (about 30%) during the same period (Ganie et al.,2022).

Due to the rising global market volatility and its consequent spillover effects, a better knowledge of stock market connections is essential. Recent financial crises are illustrative of this phenomenon, when a problem in one country can spread to others, eventually causing a worldwide economic meltdown. The new coronavirus has now also triggered substantial changes on a global scale. Many studies have shown that coronavirus significantly affects industrialized economies. Some have discovered solid proof of this (Ali et al, 2020; Zhang et al., 2021b; Song et al., 2021; Youssef et al., 2021; Gao et al., 2021). The special properties on the of covid-19 universal ties of the Pakistani standard arcade, however, have received surprisingly little academic attention. Given this background, the current research will examine the integration between six developing Asian nations. Malaysia, Indonesia, India, China, Pakistan, and Japan. There are two main reasons why the study is significant. There has been a shortage of research into the post-Covid-19 period's Pakistan's stock market's merger with international markets. Second, particular nations are Asia's quickly expanding and rising economies. However, they have gotten comparatively less devotion from researchers than other regions of the continent, as shown by the World Economic Outlook (International Monetary Fund 2022). Russia's invasion of Ukraine, the continuing COVID-19 outbreak, and the rising living expense all cast a shadow over projections. Slower growth is expected around the globe, with forecasts ranging from 3.2% now 2022 to 3.0% in future. Excepting for the start of the COVID-19 epidemic and the worldwide economic downturn, this is poorest evolution outline since 2001.

## 2. LITERATURE REVIEW

Since a country's financial integration with other countries can significantly affect the country's economic growth, studying the line across economic markets has always intrigued scholars. Academics have examined the potential interconnectedness and correlated actions of the Indian stock market with those of additional countries. Few studies have looked at the interconnections between Asian countries until the last decade, when the focus shifted to integrating the Indian market with the industrialized nations of the US, Canada, Europe, and Japan. However, the recent decade saw many studies looking into market ties with developing and growing countries.

(Bhunia and Das 2012) have connected co-integration and Granger causation among chosen markets by analyzing daily stock indexes from 2002 to 2011. Patel (2012) how the Indian stock market to those of other Asian countries; monthly data starting in July 1997 and ending in September 2012 included several statistical methods, including the Johansen trace analysis, the Granger causality test and the model for vector error correction. They have shown Positive correlations and influences from Pakistan, Sri Lanka, Malaysia, Korea, and Singapore in the Indian stock market. Established co-integration in respect to the Indian stock market folks of other certain Asian nations (Japan, China, Indonesia, Malaysia, and Hong Kong) by Potharla (2012). From the beginning of 2000 until the end of 2010, they collected monthly indices. Analysis of the variance reveals that Asian and Pacific's standard Markets possess a negligible effect the stock market in India.

(Ali et al.,2020) how key s stock markets and commodity markets are reacting to this massive health issue found exciting results when splitting our sample in three groups based on the global distribution of the coronavirus: Phase 1 (where deaths were confined to China), Phase 2 (Europe); and Phase 3 (North America).

(Deep Sharma & Bodla, 2011) looked into the relationships between the stocks of India, Pakistan, and Sri Lanka. Granger causality and vector auto-regression models were used to examine the data over seven years, beginning in January 2003 and ending in June 2010. Shown to be unidirectional causation in the investigation. Based on the data, it is clear that the Indian market shows unidirectional Granger cause for the economies of Pakistan and Sri Lanka.

On the other hand, Iqbal et al. (2011) found little evidence of integration between India and Pakistan. Seven years, beginning in January 2003 and ending in December 2009, were included in the analysis. Only between the U.S. Stock market and the Indian and Pakistani marketplaces granger causality found, according to the conclusions of Granger Causality. The countries of China, Indonesia, Malaysia, Taiwan, South Korea, India, Hong Kong, and were to have long- and short-term associations.

(Bukhari et al.,2020) Analyze the volatility spread from the Shanghai Stock Exchange in the China to the Karachi Stock Exchange in Pakistan before and during the COVID period (Karachi stock exchange). Utilized the EGARCH model to examine volatility spillover using data from the overall market and several single industries (13 total based on GICS categorization). Findings show that aggregate data samples of volatility are dissimilar to industry data samples of volatility. Discovered Return and volatility spillover are in the study's two data sets (aggregate and industries). Stakeholders should examine both the aggregate and industry information before making investment decisions, according to the study

(Bhardwaj et al,2022) The research utilized the Johansen test, causality test, and the vector correction model for evaluation. Findings indicate that the economies of Pakistan, Sri Lanka, Malaysia, Korea, and Singapore favor Indian stock market. They verified that the financial markets of India and Asian's nations (including the South Korea, China,

Indonesia, Hong Kong, Japan, and South) are interdependent on one another. They collected average monthly readings from January 2001 to November 2010 findings of the variance rottenness. The Asian stock exchanges have a negligible effect

(Arya et al,2022) During the 2009 COVID-19 epidemic, this study looked into the energetic interaction among the stock exchanges of SAARC nations. From February 13, 2013, through March 31, 2021, we use day-to-day data in time series from the India, Bangladesh, Pakistan, and Sri Lanka are four SAARC nations. Research considers the state of the market both before the COVID-19 epidemic erupted and after it peaked. Results by post-estimate methods and a novel estimation mechanism for model of autocorrelation with lags are applied, outcomes shows COVID-19 pandemic negatively impacted stock market performance in SAARC nations. pattern of integration during the COVID-19 crisis displays considerably Various patterns of long-term and temporarily. (Dhall et al.,2020) entire sample period (January 1, 2015, to June 1, 2020) also, before the COVID-19 pandemic (January 1, 2015, to January 29, 2020) designate the non-existence of industry-wide herding formation, but they do offer convincing evidence against this trend.

Furthermore, herding behavior under both bull and bear market circumstances during the COVID-19 outbreak (January 1, 2020–June 1, 2020). The data shows that the COVID-19 pandemic impeded the developing herd behavior in the business sector. The exploration helps traders prepare for the COVID-19 epidemic by providing context and information. Traders must plan their operations for the COVID-19 pandemic regime.

(Guru et al,2023) Spillovers account for roughly 28.7% (63.7% total) of the variance in forecast inaccuracy for Asia-Pacific (E.U.) market return volatility. Conferring to a dynamic study, Asia's Pacific (E.U.) gross volatility spillovers hovered at 67% (80%) during the midpoint of worldwide economic meltdown, the Debt crisis in Europe (EDC) and Covid-19. Net unpredictability transmission was determined to be most significant to other markets in the Asia-Pacific region from Singapore (Denmark).

(Insaiddoo et al,2021) Despite a weak negative correlation between Ghana's stock market and the spread of the COVID-19 epidemic, data show epidemic led to 8.23% rise in Ghana's stock market's volatility. Clustering of volatility was also established by the study. and an asymmetric result, meaning that pleasant news significantly impacts volatility more than negative news of comparable size. (Verma,2023) integrating Stock market indices continue to fluctuate in respect to one another. Measures the Integration in line with other major Asian stock indices. (Ghosh et, al,2021) for both investors and traders. Whether The Closing Prices of Stocks Will Increase or Decrease the Next Day.the results indicate that FEB Stacking, FEB DNN. (Irfan et,al 2021) The volatility of post-covid-19 gets higher than that of pre-covid-19. demonstrate the volatility of indices, portfolios, and stock prices using various volatility estimators' methods.

(Ahmad, et, al2020) The UK and US stock markets have the highest concentration of co-movement. Co Movements Between the Studied Markets, Movements Time Variation and Scale Variation, Concentration of Stock Markets Around the World Move Together and Cross Power Levels of Co Movement. Used wavelet coherency analysis.

### 3. DATA & METHODOLOGY

This research tests the long-run integration and integration in the short term ties between the economic markets of a selected number of nations. daily finishing prices of significant indices across countries reflect the financial markets. The stock market indexes included of KSE composite Index (KSE), Shanghai Composite Index (China), the Bombay Stock Index KLSE Composite Index (Malaysia), Jakarta Composite Index (Indonesia), Tokyo Composite Index (Japan), and the BSE Sensex (India). From January 1, 2017, through December 31, 2022. The daily closing values of each index were collected. By using the investing finance webpage, I collected the historical stock prices of the selected countries. Total observations are Fourteen hundred and fifty-six across all indices considered. The Division of break it all down into two parts: pre-COVID and post-COVID (2017–2019 (from January 1 until December 31, 2019) The period following the COVID-19 pandemic, spanning from January 1, 2020, to December 31, 2022. Johnson's co-integration test for long-term integration and the Granger causality test for short-term integration. For the calculation of results, I used e-views software. Variables used for the study are dependent on stock prices of all selected countries, Pakistan, Japan, China, India, Malaysia, and Indonesia, and independent are dates of the selected period.

According to unit root test results, all series are integrated; A unit root is present when the first difference level is observed. The enduring association between the selected time series using Johansen Co-integration test. If specific indices are discovered to be co-integrated, the markets in question are in a state of long-term equilibrium with one another. The maximal Eigenvalue and trace tests form the basis of Johansen Co-integration. According to the results, the null hypothesis of no co-integration is deemed to be rejected when the test statistics indicate so. are more significant than essential value. Here are the test's null hypotheses:

We have looked at descriptive statistics for all of the indexes. We reported the closing indices of various nations in their respective local currencies, and logarithmic returns from each index calculated and compared the market's descriptive statistics using these returns as a benchmark. For comparison, we have calculated the average, standard deviation, skewness, and Kurtosis and estimated Correlation coefficients to help investigate potential linkages between results. It is essential to evaluate the existence by a root unit in the time series before using any statistical instrument to make conclusions regarding market integration. Using the mean and standard deviation of a time series, the unit root test may determine if they have remained stable across the study period. To be considered stationary (in the deficiency of a unit

root), data must not deviate from its mean value but instead move in a circle around it. For testing unit root, the Augmented Dickey-Fuller test often used (ADF). Since over several periods this research is being conducted, we may formulate the following three null hypotheses: -

H01: The single time run (Pakistan/ India/China/Indonesia/Japan/Malaysia) the series does not have a unit root and not stationary at the level during the course of the entire research period.

H02: The discrete time series of Pakistan, India, China, Indonesia, Japan, and Malaysia does not exhibit a unit root. The sequence does not exhibit stationarity at the level during the pre-COVID-19 timeframe.

H03: The time series for Pakistan, India, China, Indonesia, Japan, and Malaysia do not exhibit a unit root, indicating that they are not stationary at the level during the post-COVID-19 period.

H04: There are insignificant co-integrating equalities amongst particular markets throughout the total study period.

H05: Insignificant co-integrating balances exist between selected marketplaces in the pre-covid-19 period.

H06: There are insignificant co-integrating comparisons amid certain markets through the post-covid-19 period.

Using a Granger test, we examined the possibility of a short-term association between the nations we chose. In 1969, Clive Granger devised the test to predict one-time series from information about another. Granger causality measures the strength of an association between two-time chain and can be used to infer causation. When Granger causality is present, each shift in one series causes a change in another. Granger causality is an evolving idea that considers the lag-lead connection in contrast to the static notion of correlation. Although a correlation between two-time series indicates that they are connected, only a causal relationship between two-time series allows us to foresee a change in one series due to a change in the other. The following alternative hypotheses were investigated using Granger causality in the present study:

H07: There is insignificant Granger Causal relation among markets throughout the total era.

H08: There is insignificant Granger Causal relation between markets through the pre-covid-19 age.

H09: There is insignificant Granger Causal link between markets in the period after COVID-19.

#### 4. RESULTS AND DISCUSSION

Painful volatility period experienced During the pandemic in several financial markets. Over the course of a temporal progression, the study examines two distinct sub-periods: January 2017 to December 2019, referred to as the Pre-covid-19 period, and January 2020 to December 2021. The period following the Covid-19 pandemic. They examined All selected markets' logarithmic returns. It allowed us to determine the cause of whether or not the recent market decline was initiated by COVID-19. By transforming financial results into a logarithmic scale, investors can evaluate the performance of stocks across countries without being affected by fluctuations in the value of the underlying assets. Throughout the full-time frame of the study, the regular stock return was found to be the best The prevalence rate in India is 0.049, whereas it is the lowest in China. (-0.021). (0.005).

Pre-covid-19 returns showed that the Chinese stock market had a negative return in 2017, which may be related to the bursting of the Chinese stock market bubble at the start of 2017. Indonesia (0.043) and India (0.042) had the highest average returns through the end of 2019. (0.042) The market returns during the post-COVID period were negative after COVID-19's devastation of Indonesia. On March 23, 2020, the Jakarta Composite Index reached its nadir, a mere 21 days subsequent to the initial government-sanctioned occurrences of COVID-19 (Utomo & Hanggraeni, 2021). The standard deviation (0.011) shows that the markets in Malaysia and Japan are less volatile than the other markets we considered. Following the advent of the COVID-19 pandemic, India, Indonesia, and Japan had notable elevations in the standard deviation of their results. Table 1 displays the percentage distribution of the aforementioned returns.

Be a favorably skewed yield before covariation. This confirms what previous studies have found (Esteves & Sussman, 2020; Sugandi, 2020): Indonesia suffered less damage from the Covid-19 outbreak than it did from the 2008 financial crisis. This peak-topped distribution follows a leptokurtic pattern since the Kurtosis stayed high over both intervals. Stock returns with a high kurtosis score show that investors were subject to significant market swings over the review period. We started by looking at the correlation between the chosen markets to see if and how much one market's fluctuations could influence the others. Table 2 shows the correlation matrix results.

They attributed the rise in market correlation to the COVID-19 pandemic. Because China was Pakistan's primary trading partner in the first half of 2020–2021, the correlation coefficient of Pakistan's return increased from 0.25 to 0.40. With commerce amongst India and Indonesia reaching US\$9.87billion in 2020, there was a corresponding increase in the correlation between Indian and Indonesian stock market returns, from 0.49 to 0.64. \$6.94 China and India have the lowest correlation, making portfolio diversification a viable strategy for reducing exposure to risk. The results corroborate those of Younis et al. (2020). Because it is necessary to ensure that all variables being tested for co-integration across stock indices are stationary of the same order, the The stationarity of all indices has been confirmed using the ADF unit root test. The test looks at the null assumption of data stationarity and absence of a unit root in the series. Probability values will be matched against a significance level of 5% to determine whether or not the null hypothesis holds. The null hypothesis should not be rejected when the probability exceeds 5%. On other hand, if the likelihood is less than 5%, the null hypothesis is rejected; in this situation, data are assumed to be stationary. Table 3 displays the outcomes of unit root analysis.



**Table 1: Descriptive Statistics Results**

Specifics	Entire Period						Pre Covid Period						Post Covid Period					
	Pakistan	China	India	Japan	Indonesia	Malaysia	Pakistan	China	India	Japan	Indonesia	Malaysia	Pakistan	China	India	Japan	Indonesia	Malaysia
Average	0.042	0.005	0.049	0.025	0.035	0.031	0	-0.002	0.1	0.019	0.043	0.012	0.02	0.05	0.1	0.1	-0.01	0.1
Maximum	9.65	6.8	11.57	8.28	0.7	6.17	3.48	6.8	11.57	4.466	7.01	4.9	3.47	5.55	11.56	6.17	9.7	6.17
Minimum	-11.55	-11.97	-14.1	-8.77	-9.3	-7.7	-4.21	-8.87	-14.1	-6.42	-0.3	-6.41	-8.41	-11.7	-14.4	-7.7	-6.8	-7.7
SD	0.022	0.015	0.012	0.011	0.012	0.011	0.004	0.015	0.02	0.01	0.011	0.01	0.001	0.01	0.02	0.01	0.02	0.01
Skewness	-0.33	-0.79	-0.57	-0.2	-0.29	-0.67	0.4225	-0.655	-1.06	-0.444	-0.444	-0.44	-0.44	-1.82	-1.06	-0.73	0.14	-1.73
Kurtosis	10.88	9.7	18.68	10.43	10.43	8.3	5.31	8.31	17.8	6.66	0.66	7.1	13.44	22.04	17.98	8.89	10.22	8.89

**Table 2: Correlation Matrix**

Countries	Entire Period						Pre Pandemic Era						Post Covid Phase					
	Pakistan	China	India	Japan	Indonesia	Malaysia	Pakistan	China	India	Japan	Indonesia	Malaysia	Pakistan	China	India	Japan	Indonesia	Malaysia
Pakistan	1	0.25	0.56	0.45	0.48	0.32	1	0.25	0.49	0.019	0.043	0.012	1	0.4	0.1	0.1	0.64	0.1
India		1	0.22	0.35	0.28	0.37		1	0.22	4.466	0.28	4.9		1	11.56	6.17	9.7	6.17
China			1	0.53	0.35				1	-6.42	-0.3	-6.41			1	0.31	0.43	0.28
Japan				1	0.012	0.011				1	0.011	0.01				1	0.02	0.01
Indonesia					1	-0.67					1	-0.44					1	0.22
Malaysia						1						1						1

**Table 3: Results of the unit root test**

Countries	Entire Period				Pre Pandemic era				Post Covid Phase			
	Original Level		1 <sup>st</sup> Difference		Original Level		1 <sup>st</sup> Difference		Original Level		1 <sup>st</sup> Difference	
	T-Test	Probability	T-Test	Probability	T-Test	Probability	T-Test	Probability	T-Test	Probability	T-Test	Probability
Pakistan	-2.348	0.1571	-34.0906	0	-2.29	0.175	-20.54	0	-1.3	0.6318	-18.3639	0
India	-0.4916	0.8903	-37.8379	0	0.23	0.974	-42.416	0	-0.3007	0.9781	-20.6853	0
China	-2.259	0.1857	-37.8077	0	-1.76	0.4	-29.2415	0.001	-1.3959	0.5847	-18.3521	0
Japan	-2.4114	0.1387	-16.6668	0	-2.58	0.097	-44.145	0	-0.5698	0.8739	-19.3659	0
Indonesia	-1.8331	0.3646	-37.7849	0	-0.6684	0.142	.43.124	0	-0.2968	0.4756	-14.2415	0
Malaysia	-0.9452	0.2143	-26.1427	0	0.2415	0.078	-34.214	0	-0.7841	0.2415	-12.2143	0

**Table 4: Results of the Johnsons Co integration test**

Hypothesized number of co-integration equation	Total Period		Pre Covid-19 Period		Post Covid-19 Period		Critical Values		
	Trace Statistics	Max-Eigen Statistics	Trace Statistics	Max-Eigen Statistics	probability	Trace Statistics	Max-Eigen Statistics	Trace Statistics	Max-Eigen Statistics
None	78.86*	38.51*	84.87*	84.87*		73.45	33.21	7.25	37.41
At most 1	40.36	19.69	53.33	53.33		40.24	20.36	55.12	30.21
At Most 2	20.66	9.3	28.93	28.95		19.65	11.87	35.44	24.47
At Most 3	11.37	6.45	6.45	14.86		7.22	6.84	18.22	17.33
At Most 4	4.2*	4.92*	3.88*	3.88*		1.38	1.38	3.84	3.84

Hypothesis rejected at 5% level of significance.

The results show that for any of the indices, the null hypothesis cannot be disproved at the baseline level. That is to say, none of the stock market indices are consistently found at the same level across time. While the pre-difference probability is more than 0.05, the post-difference likelihood is less than 0.05, indicating no unit root. That is, it appears that every series has a first-order integration. At a single lag interval, we have used the Johansen co-integration test. (as specified by lag length criteria) investigate further the possibility of long-term integration among the chosen economies. The Trace and Max-Eigen statistics can be estimated using the Johansen co-integration test. The hypothesis cannot be rejected at a 5% level of significance if each of these statistics is greater than its corresponding critical value. Table 4 displays the results of Johnson's co-integration.

It is impossible for there to be a co-integrated equation based on trace statistics and maximal Eigen statistics and allow for a maximum of four co-integrated equations among the chosen indices at the 5% significance level for the entire study period. Consequently, the stock indexes are long-run co-integrated, with a maximum of three co-integrating equations. If a co-integrating equation holds, it can be concluded that specific stock markets share a common long-term trend and are influenced by the exact cause. The findings corroborate the findings of earlier research by Polamalu et al. (2013), Agarwal et al. (2021), and Potharla (2012), all of which indicated long-term interconnectedness among Asian economies. Trace statistics and Max Eigen statistics rule out the existence of any fewer than four equations, and this ruling holds even for the pre-period. In addition, The statistical evidence contradicts the null hypothesis positing the absence of a co-integrating equation. In light of this, we can deduce that there can be no more than three co-integrating equations in the pre-covid era.

Nevertheless, no theory could be ruled out beyond the covid era. This could happen if there is no long-term association between market indices or if the period is too short of concluding the markets' long-term behavior. Causality test (1969) used to investigate potential short-run link between hit markets cause, and the examination regulates the effect amongst the chosen market. If X does not Granger Cause Y, then the null hypothesis holds, or X Y. If the F-statistical probability is more significant than 0.05, the null hypothesis is rejected. There will be no presumption of causation under these circumstances. However, if the F-statistic is less than 5%, the null hypothesis will be rejected, a causal relationship between the two stock markets will be inferred.

## 5. CONCLUSION

The association among the Pakistan stock market and developing Asian economies is the focus of this study. Our research covers the years 2017 through 2022 and December. To analyze the results of Covid-19, we split the time frame into two parts: two time eras: the pre-Covid period (which runs from January 1, 2017, to December 31, 2019), and the post-covid era (which runs from January 1, 2020, to December 31, 2022). From the commencement of the year 2020, specifically on January 1st. Various econometric tests, such as co-integration and Granger causality tests, have been utilized in order to examine the long-term and short-term interrelationships. On the first examination level, all stock market indices were fixed and incorporated into order 1. The economies of the developing Asian nations are displayed via co-integration analysis. There exists a contention that all markets adhere to a same trajectory and ultimately achieve equilibrium. As a result, the advantages of portfolio diversity among Asian countries may highland. In addition, the unpredictability of financial market returns as predicted by the Efficient market hypothesis (Fama, 1970) was disproved. However, the findings demonstrate that markets are interconnected in the long run and can be used for forecasting. While some bidirectional causality existed between countries in the pre-covi-19 era (for example, Indonesia and China, Japan and China, and Malaysia and Indonesia), this was no longer the case in the post-covid-19 era. When looking at causality over the total observation period, it was found that purpose was only in one direction, from Pakistan to China, rather than the other way around, as might be expected from a granger cause and effect relationship. But when looking at the pre-covid-19 era, the correlation was shown to be the other way around. Granger's meddling with China ultimately

brought down the Pakistan stock market. There was no longer any causal relationship between Pakistan and China after the end of Covid-19 era. During post-covid-19 period, there was also no correlation between the various stock markets. Inferring from this, specific stock markets have avoided being influenced by others since the emergence and proliferation of covid-19 financial markets. Indonesia's causal connection to China was one-way only. As a result, we can infer that the global spread of COVID-19 has significantly obstructed the short-run causality between the countries.

## REFERENCES

- Agrawal, P. K., Nandan, T., & Singh, A. P. (2021). Integration of the Indian stock market with select Asian stock markets: An analysis. *Indian Journal of Finance*, 15(8), 40-51.
- Ahmad Siddiqui, T., Ahmed, H., & Naushad, M. (2020). Diffusion of COVID-19 impact across selected stock markets: a wavelet coherency analysis. *Investment Management and Financial Innovations*, 17(4), 202-214.
- Ali, M., Alam, N., & Rizvi, S. A. (2020). Coronavirus – An epidemic or pandemic for financial markets. *Journal of Behavioral and Experimental Finance*, 27, 100341.
- Aslam, F., Ferreira, P., Mughal, K. S., & Bashir, B. J. I. J. o. F. S. (2021). Intraday volatility spillovers among European financial markets during COVID-19. 9(1), 5.
- Arya, V., Singh, S. J. J. o. E., & Sciences, A. (2022). Dynamics of relationship between stock markets of SAARC countries during the COVID-19 pandemic. (ahead-of-print).
- Bhardwaj, N., Sharma, N., Mavi, A. K. J. B., Management, & Engineering, E. (2022). Impact of COVID-19 on the long run and short run financial integration among emerging Asian stock markets. 20(2), 189–206-189–206.
- Bukhari, S. F. H., Ahmad, H., Hanif, H., Shah, S. F. J. I. J. o. M. E., & Finance. (2022). Volatility contagion (spillover) between Chinese and Pakistani stock markets during COVID-19: pre and post-analysis of trade-level data. 15(4), 309-330.
- Dhall, R., & Singh, B. J. M. A. (2020). The COVID-19 pandemic and herding behavior: Evidence from India's stock market. 11(3), 366-390.
- Gao, X., Ren, Y., & Umar, M. J. E. R.-E. I. (2022). To what extent does COVID-19 drive stock market volatility? A comparison between the U.S. and China. 35(1), 1686-1706.
- Ghosh, I., & Chaudhuri, T. D. (2021). FEB-Stacking and FEB-DNN Models for Stock Trend Prediction: A Performance Analysis for Pre and Post Covid-19 Periods. *Decision Making: Applications in Management and Engineering*, 4(1), 51-86.
- Deep Sharma, G., & Bodla, B. S. (2011). Inter-linkages among stock markets of South Asia. *Asia-Pacific Journal of Business Administration*, 3(2), 132-148.
- Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25(2), 383-417.
- Ganie, I. R., Wani, T. A., Yadav, M. P. J. B. P., & Research. (2022). Impact of COVID-19 outbreak on the stock market: evidence from select economies. 22785337211073635.
- Guru, B. K., & Yadav, I. S. J. T. J. o. R. F. (2023). Stock market integration and volatility spillovers: new evidence from Asia–Pacific and European markets. (ahead-of-print).
- International Monetary Fund. (2022). World economic outlook. Washington, D.C.
- Insaidoo, M., Arthur, L., Amoako, S., Andoh, F. K. J. J. o. C. E., & Studies, F. T. (2021). Stock market performance and COVID-19 pandemic: evidence from a developing economy. 14(1), 60-73.
- Iqbal, A., Khalid, N., Rafiq, S. J. I. J. o. H., & Sciences, S. (2011). Dynamic interrelationship among India, Pakistan, and United States stock markets. 6(1), 31-37.
- Irfana, M., Hasan, M. M., Ahmedc, E., & Shaikh, Z. H. (2021). Stock Market Volatility: A Pre-Post Covid19 Analysis of Emerging Markets. *Accounting and Financial Sciences Conferences*, 01(01).
- Joyo, A. S., & Levin, L. (2019). Stock Market Integration of Pakistan with Its Trading Partners: A Multivariate DCC-GARCH Model Approach. *Sustainability*, 11(2).
- Palamalai, S., & Devakumar, C. (2013). Stock market linkages in emerging Asia-Pacific markets. *Sage Open*, 3(4), 2158244013514060.
- Song, G., Xia, Z., Basheer, M. F., & Shah, S. M. A. J. E. R.-E. I. (2022). Co-movement dynamics of U.S. and Chinese stock market: Evidence from COVID-19 crisis. 35(1), 2460-2476.
- Srikanth, P. (2012). Integration of the Indian Stock Market with Other Markets in the Asia-Pacific Region. *IUP Journal of Financial Economics*, 10(1).
- Verma, R. (2023). Comovement of stock markets pre- and post-COVID-19 pandemic: a study of Asian markets. *IIM Ranchi journal of management studies*. doi:10.1108/irjms-09-2022-0086
- Wagner, A. F. (2020). What the stock market tells us about the post-COVID-19 world. *Nat Hum Behav*, 4(5), 440.
- Youssef, M., Mokni, K., & Ajmi, A. N. (2021). Dynamic connectedness between stock markets in the presence of the COVID-19 pandemic: Does economic policy uncertainty matter? *Financial Innovation*, 7(13).
- Zhang, N., Wang, A., Haq, N. U., & Nosheen, S. (2021b). The impact of COVID-19 shocks on the volatility of stock markets in technologically advanced countries. *Economic Research-Ekonomiska Istrazivanja*.