International Journal of Business and Economic Affairs (IJBEA)
11(1), 01-12 (2026)
DOI: 10.24088/IJBEA-2026-114001
ISSN: 2519-9986

Dynamic Interlinkages between Asian Stock Markets and Global Asset Classes

Khadija Batool[1], Kashif Hamid[2*]

[1]Research Scholar, Institute of Business Management Sciences, University of Agriculture, Faisalabad , Pakistan.

[2]Assistant Professor, Institute of Business Management Sciences, University of Agriculture, Faisalabad,Pakistan.

Abstract: Rising global financial uncertainty has amplified volatility across asset classes and increased synchronization among equity markets, especially in Asia. This study investigates dynamic interlinkages between major Asian stock markets i.e Pakistan (KSE-100), India (BSE SENSEX), and China (SCI) and global asset classes including Gold, Crude Oil, Exchange Rate, and Bitcoin, using daily data from January 1, 2023, to April 30, 2025. To measure both long-run equilibrium and short-run dynamics, the analysis applies the unit root tests, Johansen co-integration, Granger causality. The findings affirm that most of the variables are in integrated order one and have a high degree of long-run co-integration, which implies a high degree of financial integration between the regional stock market and global assets. Although short-run causal relationships are small and market specific, there is evidence of significant interactions between the Indian stock market and the Bitcoin as well as the contribution of the crude oil and exchange rate fluctuations as key sources of volatility transmission. Gold is relatively stable and this fact helps it to be a hedging asset, but The results highlight the increasing interdependence of Asian and global markets, the decreased benefit of diversification in times of increased uncertainty, and significant policy implications to investors and policymakers in emerging Asian economies.

Keywords: Volatility Spillover, Asian Stock Markets, Gold, Crude Oil, Bitcoin, Exchange Rate, Financial Integration, Risk Contagion, Portfolio Diversification, Emerging Economies.

Received: 12 January 2026 / Accepted: 15 February 2026 / Published: 27 March 2026

INTRODUCTION

In financial research, the spillover effect refers to how financial events influence behavior across markets, as actions in one market can trigger shifts in another. This occurs when shifts in investor behavior, both domestic and foreign, alter demand and supply dynamics unexpectedly creating a state of imbalance. The resulting disruptions allow researchers to identify financially integrated regions by analyzing the directional spread of these shocks and the associated contagion effects. (Hamid et al., 2020). Spillover of shocks is the topic of interest by the investor especially after the GFC in 2008 thus the concept of spill over needs to be determined. And the terms spillover, co-movement, contagion and co-integration are frequently used in the finance field.

The term contagion has 3 possible definitions that were referred to by World Bank (Woolcock & Narayan, 2000). The first definition considers the contagion an occurrence of cross-country shock. Secondly, this co-movement of the shocks is known as contagion; this phenomenon is clarified using the element of herding behavior. Third, under a crisis occurrence, the contagion spreads further due to the existence of co-integration observation among the nations than in the period of tranquility. Moreover, a financial crisis leads to emergence of contagion effect meaning an increase in intensity of transmission of volatility among various investment instruments within a financial marketplace (Forbes & Rigobon, 2002). In addition, the character of the co movements between the financial markets is subject to the power of the financial affiliation in addition to the characteristics of the stock markets of the distinct nations (Pretorius, 2002).

Variations in one asset's price that affect the price of another asset are known as spillovers. Because they are crucial for creating laws, risk management plans, and portfolio design, spillovers have become more significant in the financial sector. Global economic crises have plagued financial markets throughout history, underscoring

*Corresponding author: Kashif Hamid
†Email: Kashif.hamid@uaf.edu.pk

the significance of identifying the true cause of periodic crises. The markets are now interdependent due to globalization, capital flow, internationalization, and large investments (Mishra et al., 2007).

Over the past decade, Asian markets have experienced abrupt volatility changes, significantly affecting their economic stability. Additionally, many global investors perceive these markets as highly volatile in terms of investment risk. Investor responses to various market variances especially during unstable periods which may explain the erratic behavior contributing to the ongoing volatility in these regions (Hamid et al., 2020). In recent years, Asian stock markets of countries like India, China and Pakistan have been more tightly connected to the global financial system. This means that shocks, such as changes in oil prices or Bitcoin price movements occur in the global markets and the volatility can be transmitted in these regional markets (for example, investor behavior, market returns, and economic stability). The importance of Bitcoin as a transmitter of risk to traditional assets is highlighted by the global financial interlinkages (Bouri et al., 2017). There is significant effect of oil price surprises on Asian stock returns especially in the emerging market nations such as India and China (Zhang & Broadstock, 2020). Gold as an investment vehicle causes a lot of interest among the monetary circles because of its inflation hedging as well as its capacity to give an attractive risk adjusted profit (Gorton & Rouwenhorst, 2006).

The movements of the prices of gold are usually less volatile than the 5 equities as well as the returns are typically right tailed (Bouri et al., 2020). Interestingly, investors and portfolio managers gold is valued by investors and portfolio managers due to the fact that it generally has a weak positive or negative correlation with stock market indicators, which helps reduce potential losses within the stock market especially during the stressful periods. Gold is used as a heaven asset for the long time particularly during the time of economic uncertainty (Baur & Lucey, 2010). Volatility spillovers between gold prices and Indian stock markets, suggested that investors respond to gold price fluctuations as part of their portfolio risk management strategy (Sujit & Kumar, 2011). Impact of global financial factors, including gold, on Asian stock Market volatility, confirming that gold price shocks can trigger shifts in investor behavior across Asian equity markets (Narayan et al., 2010).

Most traded commodity crude oil price is very volatile and significantly impact on improving the global financial system's stability. Due to the increasing demand of energy in Asia, changes 6 in oil prices have negative impact on industrial output, inflation and corporate profitability. Fluctuations in oil prices can lead to increased uncertainty in stock markets, affecting investor's sentiment and economic performance (Ashfaq et al., 2019). It is well acknowledged that financial activity and oil prices have a significant impact on stock returns (Tchatoka et al., 2019; Phoong et al., 2023). The dynamic nature of the interaction between the stock and oil markets makes it significant.According to the economic crisis of 2008, the decline in oil prices in 2014, the Brexit referendum in 2016, the European debt crisis, COVID-19, and the Paris Climate Agreements are the primary factors that have impacted oil prices over the past 20 years. Developing countries will be impacted by the conflict in Ukraine through a variety of trade and investment channels, such as supply chains, logistic networks, foreign direct investment, and the pricing of food and energy commodities (World Bank, 2022).

Nakamoto (2008) presented the idea of Bitcoin. The cryptocurrency market has emerged as a new asset class and a crucial part of the global financial industry (Corbet et al., 2018). The market value and quantity of digital coins have increased excessively, rising from approximately $17.7 billion at the beginning of 2017 to over 700$ billion in the beginning of 2018. The first biggest issued market capitalized asset of the cryptocurrencies market, Bitcoin is rapidly gaining the attention of traders who are looking to more excellent chances and investing into substitutes or alternatives (Dyhrberg, 2016). Since the Bitcoin is the most developed cryptocurrency asset within the cryptocurrency market, the analysis of this asset can be used as a vain in the research of cryptocurrencies. Since its foundation, bitcoin has attracted special interest. Within that regard, it is always good to know the stylized facts of this digital money versue others financial and commodity markets that are extremely important to investors and portfolio managers, and even scholars. The study compared the Bitcoin market's time-varying efficiency and long-memory feature to those of the stock, gold, and currency markets. According to Bouri et al. (2017), Bitcoin is an ineffective hedge and should only be utilized for diversification.

The major objectives of this study is to analyze the volatility transmission between major Asian stock markets and global asset classes and to evaluate the extent of risk contagion and interdependence among Asian stock markets and global asset classes.

LITERATURE REVIEW

Hamid et al. (2020) highlighted how essential it is to comprehend the volatility spillovers between emerging Asian economies, especially in the regional cooperation and the Asian investment context. They perform an empirical analysis, which discusses the years between January 2000 and December 2015. The results highlighted that there is a strong bidirectional volatility spillover in the Pakistan and India, India and China, and China and Pakistan thus this implied that there is high market interconnectedness in those markets. Interestingly, the paper concluded that there were more negative shocks in volatility and such shocks were more significant as compared to their positive counterparts, implying that there is more risk when the markets fall. In addition to this, the level of volatility of the markets themselves was found to have a greater contribution to the overall market volatility than the cross-market effects and thus the dominance of domestic elements was also pictured. The results of such studies have asserted the necessity to incorporate these interlinkages into the policymaking process by regional policymakers and investors since 15 these markets are volatile, and as a consequence, there is a possibility of the occurrence of levels of contagion to regional policymakers. The study, on the whole, was a rich source of information regarding the process of the functioning of regional financial markets, underpinning the need to consider the monitoring of volatility and contribute to the economic stability and the decision making process on international investments in South Asia.

Arslanalp et al. (2016) observed that China had an increasing financial spill over in the regional markets. The principal bridge seemed to be trade connections and direct financial connections were gaining more and more importance. China still did not affect world risk premiums, and at such, its influence was not as overall as that of the United States, yet its influence in the region was close to that of Japan. Had there been a package of china associated shocks and a higher level of world risk premiums as with August 2015 and January 2016, the spillovers may have been quite substantial. In the medium-term, the financial spillover of China may have increased further as financial and other interconnections between China and regions became closer, as currently shown in the internationalization of renminbi and liberalization of the capital account in China. Arouri et al. (2015) showed connection between gold prices and stock markets had been widely explored, mainly in the background of portfolio diversification and risk management. This study has examined both volatility and returns spill overs among world gold price and the Chinese equity market between 2004 and 2011. The results revealed that past gold prices movements largely affect the volatility of stock returns in China and thus gold is an important asset to forecast stock market movement. Gold in an investment portfolio increases return on investment significantly and offers good hedging opportunities. Analysis concluded that exposure to gold can serve as a means of minimizing the financial risks, and specifically in conditions of uncertainty.

Ahmed et al. (2017) explained that the intricate relations between gold prices, oil prices, exchange rates and stock returns had been an important part of the financial and economic research. This assessment examined linkages among the macroeconomic indicators in Pakistan during the period 2005-15. Stock returns were negatively impacted by volatile and highly interconnected movements. Additionally, for 27.7% of changes in oil prices, 8.58% of changes in gold prices, and 6.6% of currency rate fluctuations, stock returns are significantly impacted negatively. The paper further strengthens the need for diversifying the strategic portfolio through investment in gold and forex besides the stock.

Ahmed et al. (2022) exposed the interplay between cryptocurrencies and emerging stock markets had garnered increasing attention in financial research. This analysis explored the dynamics associations between cryptocurrency valuations and stock indices over the period 2015 to 2020. The findings revealed that digital assets operate largely independently from traditional markets. However, when examining conditional volatility, evidence of interdependence emerges, indicating potential long term volatility linkages. These results underscore the highly volatile and persistent nature of cryptocurrencies, necessitating prudent investment strategies. The implications of this research enhanced the boarder comprehension of how digital currencies interact with conventional financial markets, offering valuable insights for investors and policymakers in risk management and portfolio diversification.

Sarwar et al. (2020) showed relationship between crude oil and stock market had been widely studied, particularly in emerging economies. This study examined volatility spillovers between crude oil prices and stock markets in Karachi, Shanghai and Bombay from 1997 to 2014. Findings indicated a bidirectional spillover in Karachi, unidirectional spillovers in Shanghai and mixed results for Bombay. The oil price shocks impact

remained consistent before and after financial crises, with variations across different data frequencies. These results emphasized the strong connection among oil price fluctuations and stock market volatility. To understand these dynamics is essential for lawmakers and investors looking to control risk and portfolio diversification in energy dependent markets.

Yousaf et al. (2021) evaluated gold's safe-haven and hedging potential versus thirteen Asian stock markets following COVID-19. Additionally, it demonstrated that gold is a powerful hedge (diversifier) in most (but not all) Asian stock markets during the COVID-19 sub-period; it had weak safe-haven in Pakistan and Thailand and good safe-haven in China, Indonesia, Singapore, and Vietnam. The optimum weight in the stock-gold portfolios was higher in the pre-COVID-19 sub-period than in the COVID-19 sub-period, suggesting that participants in the portfolio made larger gold investments during the COVID-19 sub-period. During the COVID-19 sub period, the majority of Asian stock markets showed improvements in their hedging efficiency.

Zeng et al. (2023) concentrated on the interconnections between global financial markets, specifically in south Asia and China. This study examined the dynamic dependencies and return spillovers among stock markets in India, Pakistan and China, as well as gold and bitcoin markets from 2015-21. Results showed that developed markets had a large impact on transmission to Chinese and Pakistani market and gold acted as an effective hedge and diversifier, especially after the COVID-19 outbreak. Gold was stable in South Asian and Chinese markets during crisis. The study provided valuable insights for investors and policymakers regarding the management of risks and strategies for portfolio diversification in uncertain environment. These findings highlighted the importance of monitoring global shocks and their transmission to regional markets.

RESULT AND DISCUSSION

Table 1: Unit Root Test

	KSE_100	**BSE SENSEX**	**SCI**	**BITCOIN**	**CRUDE OIL**	**GOLD**	**PKR/ USD**
With Constant- t-Statistic	0.44	-1.12	-2.39	-0.75	-2.31	1.22	-5.18
With Constant- Prob.	0.98	0.71	0.14	0.83	0.17	1	0
With Constant & Trend - t-Statistic	-2.26	-2.19	-2.39	-2.64	-2.92	-1.17	-5.09
With Constant & Trend - Prob.	0.45	0.49	0.38	0.26	0.16	0.91	0
Without Constant & Trend - t-Statistic	3.26	1.26	0.09	1.2	-0.72	2.65	0.8
Without Constant & Trend - Prob.	1	0.95	0.71	0.94	0.41	1	0.88
With Constant- 1st Diff - t-Statistic	-16.82	-22.71	-24.9	-22.51	-22.28	-24.41	-20.34
With Constant- 1st Diff - Prob.	0	0	0	0	0	0	0
With Constant & Trend- 1st Diff - t-Statistic	-16.85	-22.69	-24.9	-22.48	-22.3	-24.56	-20.44
With Constant & Trend- 1st Diff - Prob.	0	0	0	0	0	0	0
Without Constant & Trend- 1st Diff - t-Statistic	-19.49	-22.64	-24.9	-22.4	-22.29	-24.11	-20.32
Without Constant & Trend - 1st Diff - Prob.	0	0	0	0	0	0	0

The results ADF unit root test has shown a valuable perception into the stationarity of the selected financial

and economic time series. At level, the null hypothesis that each variable has a unit root and is thus non-stationary could not be rejected for most of the variables, including KSE-100, BSE SENSEX 30, Shanghai Composite Index, Bitcoin, Crude Oil, and Gold, as their p-values were significantly higher than the 0.05 threshold across all specifications. This indicates that these variables are non-stationary in their level form. However, the PKR/USD exchange rate stood out as the only variable that was stationary at level, showing strong statistical significance with p-values below 0.01 in both the constant and trend models. Upon first differentiating, all the variables became stationary, which was already indicated by highly significant p-values (0.0000) in all model specifications, confirming that they are joined of order one, I(1), except for PKR/USD, which is integrated of order zero, I(0), as it was already stationary at level. These findings imply that most of the time series need to be different once to achieve stationarity that is a critical requirement for further time series modeling such as VAR, VECM, or co-integration analysis.

Trends of Stock prices and Other Asset Classes

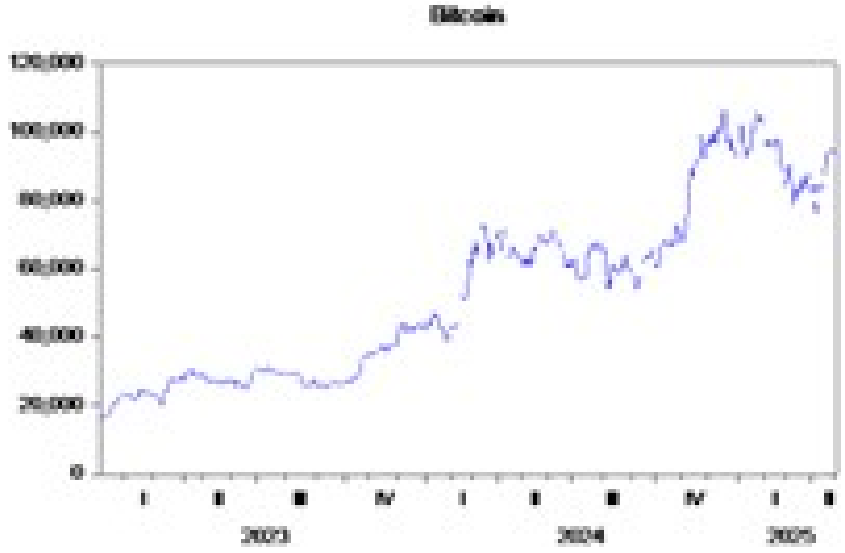

Figure 1: Trend of Bitcoin at Level

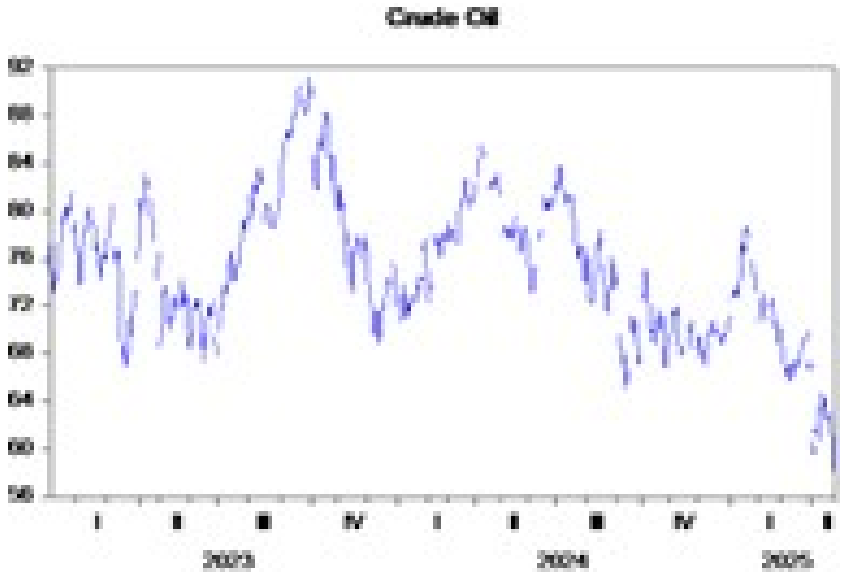

Figure 2: Trend of Crude Oil at Level

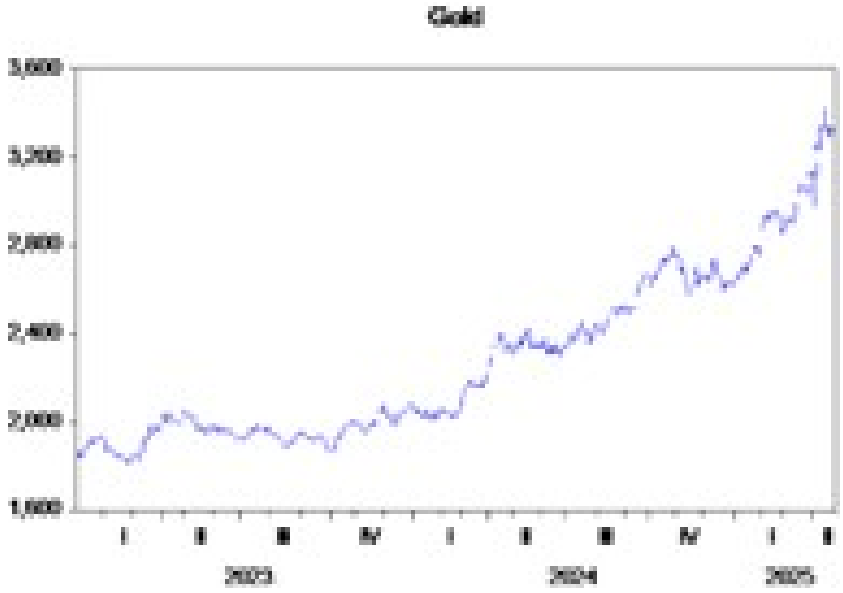

Figure 3: Trend of Gold at Level

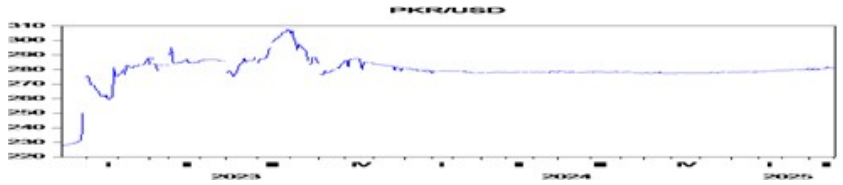

Figure 4: Trend of PKR/USD at Level

The graphical trends indicate that KSE-100, BSE SENSEX, and Shanghai indices generally follow an upward but volatile movement, while gold shows a consistent rising trend. Bitcoin and crude oil exhibit high fluctuations, whereas PKR/USD remains relatively stable. Overall, these plots suggest that at this level the data is non-stationary, showing trends and variations over time.

Technical analysis of Return Data

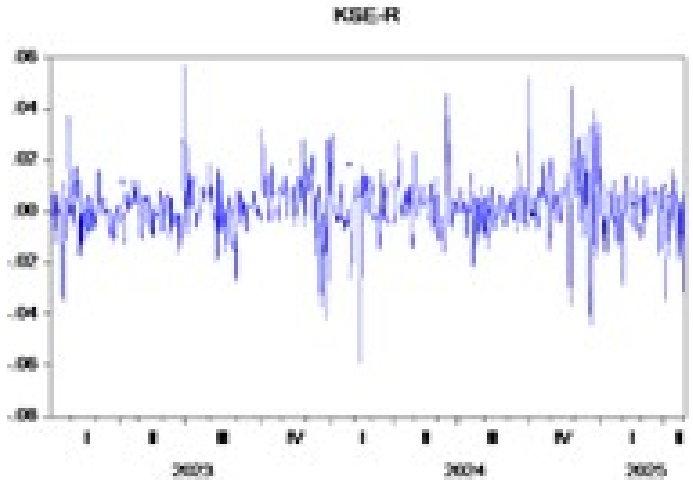

Figure 5: Trend of KSE-100 at First Difference

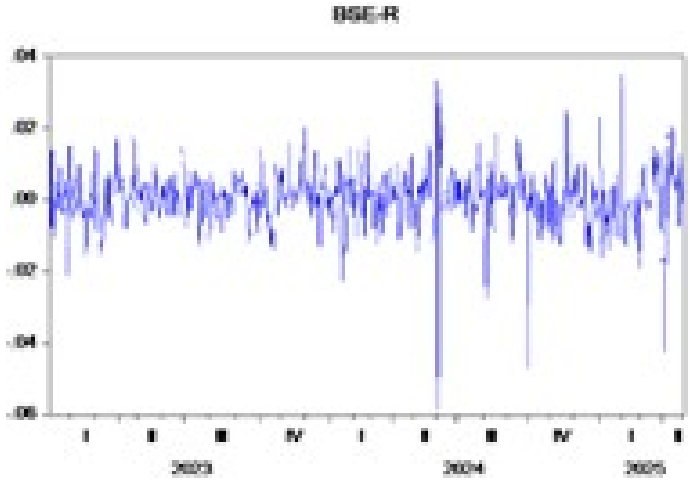

Figure 6: Trend of BSE SENSEX at First Difference

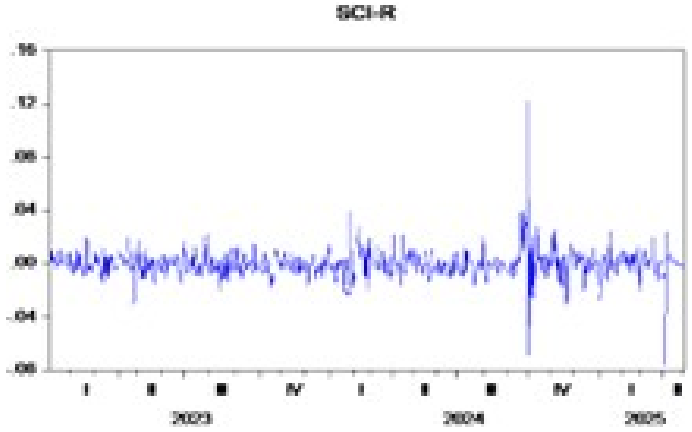

Figure 7: Trend of SCI-R at First Difference

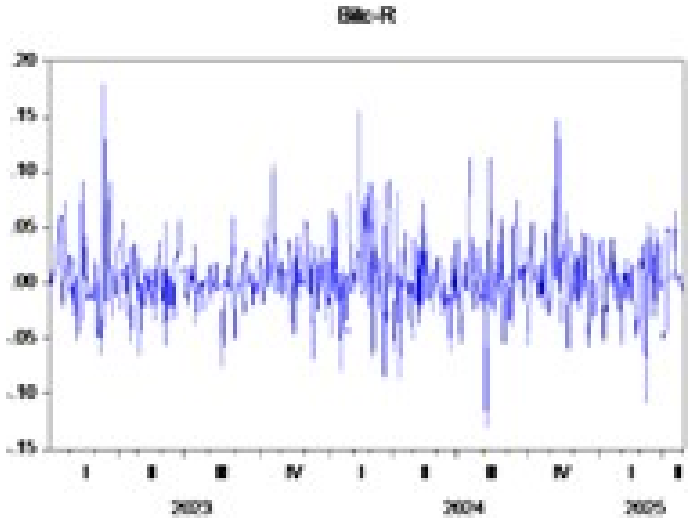

Figure 8: Trend of Bitcoin at First Difference

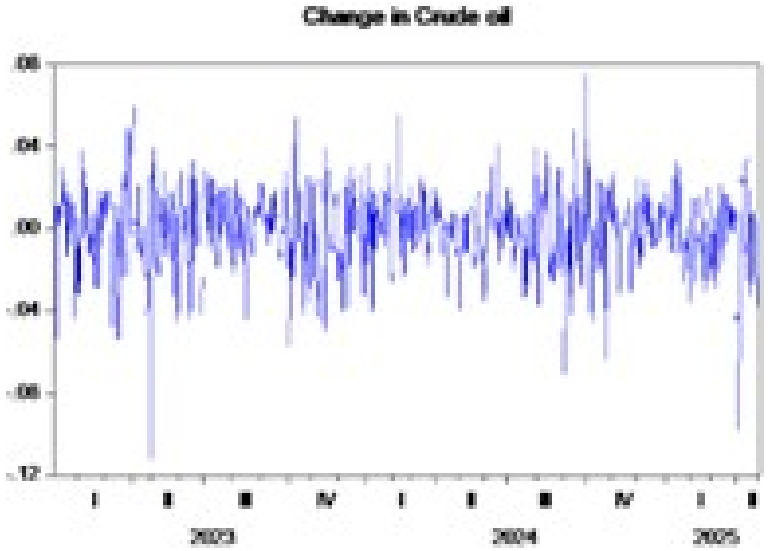

Figure 9: Trend of Crude Oil at First Difference

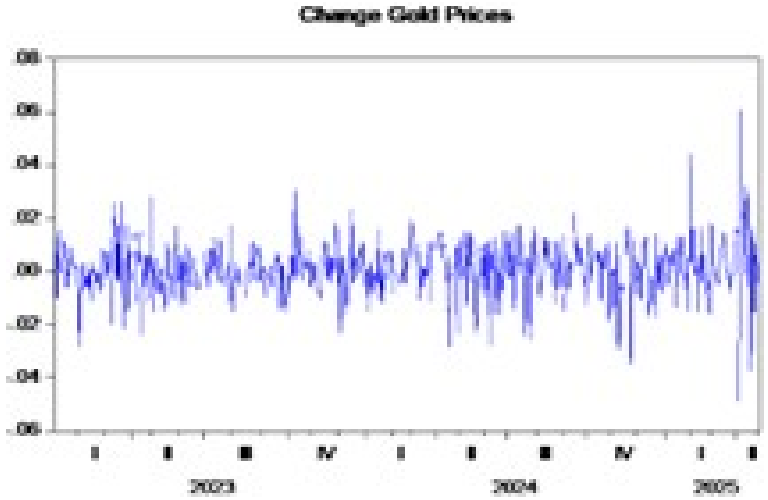

Figure 10: Trend of Gold at First Difference

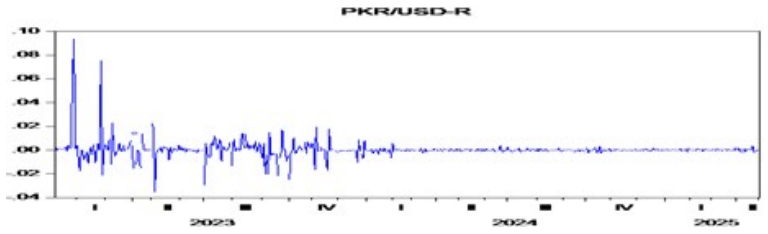

Figure 11: Trend of PKR/USD at First Difference

The return series (first difference) of KSE-100, BSE SENSEX, Shanghai, Bitcoin, crude oil, gold, and PKR/USD fluctuate around zero without a clear trend. This indicates that at first difference, the data becomes stationary, making it suitable for further econometric modeling and volatility analysis.

Johansen Co-integration Test

Table 2: Unrestricted Co-integration Rank Test

No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value	Prob.
None	0.24	707.69	125.62	0
At most 1	0.23	575.31	95.75	0
At most 2	0.2	445.7	69.82	0
At most 3	0.18	334.4	47.86	0
At most 4	0.16	238.75	29.8	0
At most 5	0.15	151.09	15.49	0
At most 6	0.14	73.8	3.84	0
Trace test indicates 7 co-integrating eqn (s) at the 0.05 level				

Based on the results, the null hypothesis of no co-integration (None) could be rejected at 5 percent significance level, since the trace statistic (707.6895) is greater than the critical value (125.6154) with insignificant p-value (0.0001).This pattern continues across all subsequent ranks, from "At most 1" to "At most 6", with each trace statistic being significantly higher than its respective critical value and with all p-values close to zero. The test concludes that there are seven co-integrating equations among the variables under investigation at the 5% level. This implies a strong long-term equilibrium relationship among the included variables, suggesting that while the individual series may be non-stationary in levels, they move together in the long run. Such findings are vital for portfolio diversification, policy formulation, and understanding the structural linkages across international financial markets.

Table 3: Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

No. of CE(s)	Eigenvalue	Max-Eigen Statistic	Critical Value	Prob.
None	0.24	132.38	46.23	0
At most 1	0.23	129.62	40.08	0
At most 2	0.2	111.3	33.88	0
At most 3	0.18	95.64	27.58	0
At most 4	0.16	87.67	21.13	0
At most 5	0.15	77.29	14.26	0
At most 6	0.14	73.8	3.84	0

The Unrestricted Co-integration Rank Test (Maximum Eigenvalue) presented here is a part of the Johansen Co-integration Test framework. This version of the test examines whether the number of co-integrating relationships among a set of time series variables is exactly r against the alternative of r+1. It focuses on the strength of the largest eigenvalue at each step in identifying distinct long-run equilibrium relations. From the table, the maximum eigenvalue statistics for each hypothesized number of co-integrating equations (CEs) starting from “None” to “At most 6” are all significantly greater than their corresponding critical values at the 5% level. Each row also shows a p-value of 0.0000, indicating very strong evidence to reject the null hypothesis at every stage. As a result, the Max-Eigenvalue test indicates the presence of 7 co-integrating equations among the variables at the 5% significance level. This confirms the earlier Trace Test result and strongly suggests a robust long-term equilibrium relationship among the included time series. This outcome is particularly relevant for empirical studies analyzing Asian stock markets and global asset classes, as it highlights the existence of multiple stable, long-run associations. Such findings support the notion of market interdependence and are valuable for investment strategies, risk management, and policymaking in the context of global financial integration.

Granger Causality Test

Table 4: Granger Causality Test for stock markets and global asset classes

Null Hypothesis	Obs.	F-Statistic	Prob.
BSE_R → KSE_R	495	0.62	0.54
KSE_R → BSE_R		0.78	0.46
SCI_R → KSE_R	495	1.09	0.34
KSE_R → SCI_R		0.13	0.88
BITC_R → KSE_R	495	1.41	0.25
KSE_R → BITC_R		0.45	0.64
CHANGE_IN_CRUDE_OIL → KSE_R	495	0.42	0.66
KSE_R → CHANGE_IN_CRUDE_OIL		0.12	0.89
CHANGE_GOLD_PRICES → KSE_R	495	0.66	0.52
KSE_R → CHANGE_GOLD_PRICES		0.27	0.76
PKR_USD_R → KSE_R	495	1.16	0.31
KSE_R → PKR_USD_R		0.11	0.9
SCI_R → BSE_R	495	0.21	0.81
BSE_R → SCI_R		4.83	0.01
BITC_R → BSE_R	495	3.49	0.03
BSE_R → BITC_R		3.97	0.02
CHANGE_IN_CRUDE_OIL → BSE_R	495	0.92	0.4
BSE_R → CHANGE_IN_CRUDE_OIL		2.15	0.12
CHANGE_GOLD_PRICES → BSE_R	495	2.5	0.08
BSE_R → CHANGE_GOLD_PRICES		0.12	0.88
PKR_USD_R → BSE_R	495	0.07	0.93
BSE_R → PKR_USD_R		0.21	0.81
BITC_R → SCI_R	495	0.72	0.49
SCI_R → BITC_R		0.11	0.9
CHANGE_IN_CRUDE_OIL → SCI_R	495	1.75	0.18
SCI_R → CHANGE_IN_CRUDE_OIL		0.39	0.68
CHANGE_GOLD_PRICES → SCI_R	495	0.4	0.67
SCI_R → CHANGE_GOLD_PRICES		3.87	0.02
PKR_USD_R → SCI_R	495	0.63	0.53
SCI_R → PKR_USD_R		0.18	0.84
CHANGE_IN_CRUDE_OIL → BITC_R	495	0.59	0.55
BITC_R → CHANGE_IN_CRUDE_OIL		1.3	0.27
CHANGE_GOLD_PRICES → BITC_R	495	1.97	0.14
BITC_R → CHANGE_GOLD_PRICES		0.12	0.89
PKR_USD_R → BITC_R	495	0.09	0.91
BITC_R → PKR_USD_R		0.3	0.74
CHANGE_GOLD_PRICES → CHANGE_IN_CRUDE_OIL	495	1.59	0.21
CHANGE_IN_CRUDE_OIL → CHANGE_GOLD_PRICES		2.21	0.11
PKR_USD_R → CHANGE_IN_CRUDE_OIL	495	0.21	0.81
CHANGE_IN_CRUDE_OIL → PKR_USD_R		0.98	0.38
PKR_USD_R → CHANGE_GOLD_PRICES	495	0.24	0.78
CHANGE_GOLD_PRICES → PKR_USD_R		0.1	0.9

The Granger causality test results reveal limited but noteworthy interdependencies among the selected financial variables. In the case of stock market returns, the test shows that the Bombay Stock Exchange (BSE_R) does not Granger cause the Karachi Stock Exchange (KSE_R) and vice versa, as indicated by high p-values (0.5382 and

0.4578, respectively). Similarly, there is no Granger causality between KSE_R and SCI_R, KSE_R and Bitcoin (BITC_R), or KSE_R and macroeconomic variables such as crude oil, gold, and exchange rates, as all associated p-values are well above 0.05, indicating the absence of predictive relationships.

However, some significant causality relationships emerge in other pairs. For instance, BSE_R Granger causes SCI_R with a p-value of 0.0083, suggesting that movements in the Indian stock market can help predict movements in the Chinese market. Additionally, BSE_R and BITC_R exhibit bidirectional Granger causality (p-values of 0.0312 and 0.0195), indicating a strong feedback relationship between Bitcoin and the Indian stock market. A further significant unidirectional relationship exists from SCI_R to gold prices ($p = 0.0215$), implying that changes in the Chinese stock market may help predict changes in gold prices. For most other pairs including crude oil, gold prices, and the PKR/USD exchange rate Granger causality is not supported, as indicated by high p-values (all > 0.05), suggesting that these variables do not significantly predict each other within this framework. Particularly, the PKR/USD exchange rate appears to be independent of and uninfluential on the other variables in this system, with no significant causality detected in either direction with any stock index or commodity price.

While the majority of variable pairs exhibit no statistically significant predictive relationships, a few exceptions, especially involving BSE_R, SCI_R, and BITC_R, suggest some degree of market interconnectedness across India, China, and the cryptocurrency sector. These findings emphasize the potential for regional or sector-specific forecasting opportunities while highlighting that broader global variables like crude oil and currency movements may not directly predict local market returns in this sample period.

CONCLUSION

This paper has found that the Asian stock markets and world asset classes are highly integrated, especially in the long term, based on the Johansen co-integration tests which have established a series of steady equilibrium connections between the stock indices, commodities, cryptocurrency and the exchange rate. Although the majority of the variables were non-stationary and on level, and then developed into stationary ones after the first difference, this confirmed the use of advanced econometric methods of volatility analysis. The findings of the Granger causality test show that there are usually short-run spillovers that are market-specific, but there are also significant relationships, including the impact of Indian stock market on the Chinese market and the two-way impact between Bitcoin and Indian equities, which is a manifestation of the new role of Bitcoin in financial markets. The Pakistani stock market and the PKR/USD exchange rate, on the contrary, exhibit relatively poor transmission effects over the short-term, indicating that it is maybe partially insulated against short-term global shocks. Overall, this high interdependence between these markets over the long term suggests that there would be less benefits of diversification during times of global uncertainty, the role of gold as a relatively stable hedging instrument continues to be important and that investors and policymakers would have to take on dynamic risk management and pay close attention to cross-market linkages in an increasingly integrated global financial system.

REFERENCES

Ahmed, F., Kashif, M., & Feroz, F. (2017). Dynamic relationship between gold prices, oil prices, exchange rate and stock returns: Empirical evidence from Pakistan. *NUML International Journal of Business & Management, 12*(1), 109–126.

Arouri, M. E. H., Lahiani, A., & Nguyen, D. K. (2015). World gold prices and stock returns in China: Insights for hedging and diversification strategies. *Economic Modelling, 44*, 273–282. https://doi.org/10.1016/j.econmod.2014.10.022

Arslanalp, M. S., Liao, W., Piao, S., & Seneviratne, M. (2016). *China's growing influence on Asian financial markets* (Working Paper No. 16/173). International Monetary Fund. https://doi.org/10.5089/9781475525137.001

Ashfaq, S., Tang, Y., & Maqbool, R. (2019). Volatility spillover impact of world oil prices on leading Asian energy exporting and importing economies' stock returns. *Energy, 188*, 116002. https://doi.org/10.1016/j.energy.2019.116002

Baur, D. G., & Lucey, B. M. (2010). Is gold a hedge or a safe haven? An analysis of stocks, bonds and gold. *Financial Review, 45*(2), 217–229. https://doi.org/10.1111/j.1540-6288.2010.00243.x

Bouri, E., Gupta, R., Tiwari, A. K., & Roubaud, D. (2017). Does Bitcoin hedge global uncertainty? Evidence from wavelet-based quantile-in-quantile regressions. *Finance Research Letters, 23,* 87–95. https://doi.org/10.1016/j.frl.2017.02.009

Bouri, E., Shahzad, S. J. H., Roubaud, D., Kristoufek, L., & Lucey, B. (2020). Bitcoin, gold, and commodities as safe havens for stocks: New insight through wavelet analysis. *The Quarterly Review of Economics and Finance, 77*, 156–164. https://doi.org/10.1016/j.qref.2020.03.004

Corbet, S., Lucey, B., Peat, M., & Vigne, S. (2018). Bitcoin Futures—What use are they? *Economics Letters, 172*, 23–27. https://doi.org/10.1016/j.econlet.2018.07.031

Dyhrberg, A. H. (2016). Bitcoin, gold and the dollar–A GARCH volatility analysis. *Finance Research Letters, 16,* 85–92. https://doi.org/10.1016/j.frl.2015.10.008

Forbes, K. J., & Rigobon, R. (2002). No contagion, only interdependence: Measuring stock market comovements. *The Journal of Finance, 57*(5), 2223–2261. https://doi.org/10.1111/0022-1082.00494

Gorton, G., & Rouwenhorst, K. G. (2006). Facts and fantasies about commodity futures. *Financial Analysts Journal, 62*(2), 47–68. https://doi.org/10.2469/faj.v62.n2.4083

Hamid, K., Ghafoor, M. M., & Saeed, M. Y. (2020). Emerging markets and volatility spillover effects: Empirical evidence from regional emerging economies of Pakistan, China, India, and Bangladesh. *Global Economics Review, 5*(1), 102–116. https://doi.org/10.31703/ger.2020(V-I).09

Mishra, A. K., Swain, N., & Malhotra, D. K. (2007). Volatility spillover between stock and foreign exchange markets: Indian evidence. *International Journal of Business, 12*(3), 257–277.

Nakamoto, S. (2008). Bitcoin: *A peer-to-peer electronic cash system.* Bitcoin.org. https://bitcoin.org/bitcoin.pdf

Narayan, P. K., Narayan, S., & Zheng, X. (2010). Gold and oil futures markets: Are markets efficient? *Applied Energy, 87*(10), 3299–3303. https://doi.org/10.1016/j.apenergy.2010.03.020

Phoong, S. W., Mahi, M. A., & Phoong, S. Y. (2023). A Markov switching approach in assessing oil price and stock market nexus in the last decade: The impact of the COVID-19 pandemic. *SAGE Open, 13*(1). https://doi.org/10.1177/21582440231153855

Pretorius, E. (2002). Economic determinants of emerging stock market interdependence. *Emerging Markets Review, 3*(1), 84–105. https://doi.org/10.1016/S1566-0141(01)00032-2

Sarwar, S., Tiwari, A. K., & Tingqiu, C. (2020). Analyzing volatility spillovers between oil market and Asian stock markets. *Resources Policy, 66*, 101608. https://doi.org/10.1016/j.resourpol.2020.101608

Sujit, K. S., & Kumar, B. R. (2011). Study on dynamic relationship among gold price, oil price, exchange rate and stock market returns. *International Journal of Applied Business and Economic Research, 9*(2), 145–165.

Tchatoka, F. D., Masson, V., & Parry, S. (2019). Linkages between oil price shocks and stock returns revisited. *Energy Economics, 82,* 42–61. https://doi.org/10.1016/j.eneco.2019.06.004

Woolcock, M., & Narayan, D. (2000). Social capital: Implications for development theory, research, and policy. *The World Bank Research Observer, 15*(2), 225–249. https://doi.org/10.1093/wbro/15.2.225

World Bank. (2022). *The impact of the war in Ukraine on global trade and investment*. https://doi.org/10.1596/37359

Yousaf, I., Bouri, E., Ali, S., & Azoury, N. (2021). Gold against Asian stock markets during the COVID-19 outbreak. *Journal of Risk and Financial Management, 14*(4), 186. https://doi.org/10.3390/jrfm14040186

Zeng, H., Lu, R., & Ahmed, A. D. (2023). Dynamic dependencies and return connectedness among stock, gold and Bitcoin markets: Evidence from South Asia and China. *Equilibrium. Quarterly Journal of Economics and Economic Policy, 18*(1), 49–87.

Zhang, D., & Broadstock, D. C. (2020). Global financial crisis and rising connectedness in the international commodity markets. *International Review of Financial Analysis, 68*, 101239. https://doi.org/10.1016/j.irfa.2018.08.003