

EXAMINING THE IMPACT OF CRYPTOCURRENCY ON STOCK MARKET RETURNS: EVIDENCE FROM THE PAKISTAN STOCK EXCHANGE (KSE-100 INDEX)

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Abstract

This study examines the impact of cryptocurrency returns on stock market performance in Pakistan using monthly data from 2015 to 2025. The KSE-100 Index is analyzed against Bitcoin, Ethereum, and Tether (USDT) returns, along with exchange rate and trading volume as control variables. Ordinary Least Squares (OLS) regression results reveal no significant relationship before COVID-19; however, post-pandemic data show a strong positive link between Ethereum and KSE-100 returns, while Bitcoin remains insignificant. The exchange rate also became a significant factor, indicating increased macro-financial integration. Overall, findings suggest that Pakistan's stock market has grown moderately connected with global digital-asset movements after COVID-19.



INTRODUCTION

1.1 Background of the Study

With the advent of the digitalization of the financial systems it has transformed how assets are looked at, created, traded and how their valuation happens. It has changed our outlook on financial assets. One of the top revolutionary developments has been the emergence of the cryptocurrencies, which are decentralized digital assets that operate independent of the traditional banking systems. Bitcoin one of the leading cryptocurrencies introduced to the world by Satoshi Nakamoto in 2008 has been the cause of inspiration for many other digital currencies and tokens. These virtual currencies are traded globally on various platforms and have gained increasing attention from both investors and policymakers for their potential to disrupt conventional financial markets (Corbet et al., 2019).

If we look at the global market and its integration of traditional financial systems and cytocurrency markets, it has become a significant topic for academic

research. Studies show that cryptocurrencies, especially bitcoin and Ethereum are characterized by extreme volatility and speculative dynamics making them potentially influential in shaping investor sentiment and capital allocation (Dyhrberg, 2016; Bouri et al., 2017). In developed countries, academic researchers have observed some sort of correlation between the cryptocurrency returns and the stock market indices especially in periods of financial distress garnering evidence in support of it being used as a safe haven currency (Yousaf & Yarovaya, 2022). In developing countries such as Pakistan, this relationship remains underexplored. Despite regulatory uncertainty, Pakistan has one of the fastest-growing bases of cryptocurrency users, with young investors increasingly seeking exposure to digital assets (Chainalysis, 2024). The Pakistan Stock Exchange (PSX), represented by the KSE-100 Index, remains the primary indicator of equity market performance. As cryptocurrencies attract investor attention, questions

arise regarding their potential impact on traditional asset classes within the domestic context. Understanding whether cryptocurrency movements influence the KSE-100 Index could help clarify how digital assets interact with Pakistan's macro-financial system.

1.2 Problem Statement

Although global studies highlight potential linkages between cryptocurrency and equity markets, empirical evidence for Pakistan is still limited. Prior research mostly explores volatility spillovers rather than direct return effects (Hussain et al., 2024; Gul et al., 2023). The COVID-19 pandemic further altered investor behavior and market dynamics, potentially increasing cross-market interactions (Yousaf & Yarovaya, 2022). However, it remains unclear whether cryptocurrency returns—particularly those of Bitcoin, Ethereum, and Tether—significantly influence KSE-100 returns before or after COVID-19. This study addresses that gap through quantitative analysis using monthly data from 2015 to 2025.

1.3 Research Objectives

The main objective of this study is to examine the effect of cryptocurrency returns on stock market performance in Pakistan. The specific objectives are:

1. To analyze the relationship between Bitcoin, Ethereum, and Tether returns and KSE-100 Index returns.
2. To assess whether the impact differs between pre-COVID (2015–2019) and post-COVID (2020–2025) periods.
3. To investigate whether cryptocurrency trading volume (Tether volume) influences stock market liquidity or volatility.
4. To evaluate the effect of exchange rate movements (USD/PKR) as a control variable in explaining KSE-100 returns.

1.4 Research Questions

Based on the above objectives, this study addresses the following questions:

1. Do cryptocurrency returns significantly affect KSE-100 Index returns in Pakistan?
2. Has the relationship between cryptocurrencies and the PSX changed before and after COVID-19?

3. Does Tether trading volume serve as a liquidity proxy that influences the KSE-100?
4. How do macroeconomic factors such as the USD/PKR exchange rate interact with cryptocurrency effects on PSX returns?

1.5 Significance of the Study

This study provides empirical insight into the interaction between the cryptocurrency market and Pakistan's stock market. Academically, it contributes to literature on cross-market linkages in emerging economies, complementing global research on digital-asset integration (Corbet et al., 2019; Bouri et al., 2017). Practically, it helps policymakers understand whether fluctuations in crypto assets can affect domestic market stability. For investors, the findings inform diversification and risk-management decisions—especially in contexts where cryptocurrencies may act as speculative rather than hedging instruments.

1.6 Scope of the Study

The study uses monthly data from January 2015 to December 2025, covering both pre- and post-COVID phases. Independent variables include Bitcoin, Ethereum, and Tether returns; control variables include the USD/PKR exchange-rate return, market volatility, and Tether trading volume. Ordinary Least Squares (OLS) regression with robust standard errors is employed to estimate effects. While the study focuses on linear relationships, it sets the foundation for future work using advanced models such as VAR or GARCH.

2. Literature Review

Research on the relationship between cryptocurrencies and traditional financial markets has expanded rapidly since the launch of Bitcoin. Scholars have explored return co-movements, volatility spillovers, and the potential of digital assets to act as hedges or safe havens. Evidence from advanced economies is mixed, while studies in emerging markets such as Pakistan remain limited.

2.1 Cryptocurrencies: Characteristics and Market Behavior

Cryptocurrencies are digital assets that rely on blockchain technology and trade without central intermediaries. Early studies emphasize their

speculative nature and extreme volatility relative to conventional assets (Dyhrberg, 2016). Bitcoin exhibits hedging characteristics similar to gold in certain periods but remains highly unstable (Dyhrberg, 2016). Later work shows that cryptocurrencies occupy a hybrid role—sometimes correlated with mainstream assets and sometimes behaving independently (Corbet et al., 2019).

Wavelet-coherence analysis indicates that cryptocurrency prices respond to a mix of sentiment-driven and macroeconomic factors at multiple time scales (Kristoufek, 2015). Such complexity implies that crypto–equity relationships can shift over time and across frequencies.

2.2 Return Co-movements and Time-Varying Connectedness

Studies have tested whether cryptocurrencies move in tandem with equities and whether these relationships are stable. Correlations are generally low but rise during periods of financial stress (Corbet et al., 2019). Time–frequency analyses confirm that linkages intensify in crises and weaken during calm periods (Umar & Gubareva, 2020). During the COVID-19 pandemic, heightened risk aversion increased global market integration. Co-movement between crypto and equities became more pronounced, indicating a temporary convergence under stress (Yousaf & Yarovaya, 2022). This finding supports separating pre- and post-COVID phases in empirical testing.

2.3 Volatility Spillovers, Contagion, and Systemic Risk

A large portion of literature focuses on volatility transmission rather than mean-return effects. Evidence from multivariate GARCH and DCC models shows that volatility spillovers from cryptocurrencies to other assets rise during turbulent periods (Bouri et al., 2017; Umar et al., 2022). For Pakistan, MGARCH analysis detects volatility transmission from Bitcoin and Ethereum to the PSX (Hussain et al., 2024). The result suggests that the Pakistan Stock Exchange is indirectly affected by global crypto shocks, especially in unstable conditions. However, these effects appear mainly in volatility, not in directional returns. Because volatility can raise perceived risk without affecting expected returns, identifying both channels separately is crucial.

2.4 Cryptocurrencies as Hedges or Safe Havens

Empirical findings on hedging roles are inconsistent. Bitcoin occasionally behaves as a weak hedge but not as a reliable safe haven (Bouri et al., 2017; Dyhrberg, 2016). Comparative studies show that Bitcoin's hedging performance is inferior to gold and highly context dependent (Shahzad et al., 2020). Therefore, cryptocurrencies may offer short-term diversification benefits but cannot ensure downside protection in sustained equity downturns.

2.5 Drivers of Cryptocurrency Prices and the COVID Context

Search intensity, liquidity conditions, and speculative enthusiasm strongly influence cryptocurrency prices (Kristoufek, 2015; Corbet et al., 2019). Global shocks such as the COVID-19 crisis significantly increased these sensitivities, aligning digital-asset movements with macroeconomic uncertainty (Umar et al., 2022; Yousaf & Yarovaya, 2022).

If similar behavioral reactions occurred among Pakistani investors, crypto sentiment might have indirectly affected local equity decisions. Yet given Pakistan's regulatory restrictions and relatively small institutional participation, such spillovers likely remained weak.

2.6 Evidence from Global Markets

International evidence reveals dynamic and often asymmetric linkages between cryptocurrencies and traditional assets. Cross-market spillovers intensify during stress periods (Corbet et al., 2018; Corbet et al., 2019). Bitcoin shows occasional hedge behavior but loses that function when volatility spikes (Bouri et al., 2017).

Econometric methods such as DCC-GARCH, VAR, and wavelet coherence models capture these shifting relationships more effectively than static correlations (Umar & Gubareva, 2020). The overall implication is that crypto–equity integration is episodic and crisis driven.

2.7 Evidence from Emerging Markets and Pakistan

Emerging markets provide unique contexts due to shallower capital markets and evolving regulations. Volatility spillovers from Bitcoin and Ethereum to PSX returns have been documented (Hussain et al.,

2024). Domestic macroeconomic variables, however, explain little of Bitcoin's price dynamics in Pakistan, implying global determinants dominate (Gul et al., 2023).

Regional findings show that the strength of crypto-equity linkages correlate with market openness and institutional depth. In Pakistan's largely retail-based setting, return-level effects are expected to be weaker even if volatility connections exist (Yousaf & Yarovaya, 2022).

2.8 Theoretical Integration and Implications

The relationship between cryptocurrencies and stock markets can be partially explained through the Efficient Market Hypothesis (EMH), which posits that financial markets instantly reflect all available information in asset prices (Fama, 1970). Under EMH, it would be expected that any shocks in the cryptocurrency market—such as changes in Bitcoin or Ethereum prices—should only affect stock markets if they convey new and relevant information about future economic performance.

However, the cryptocurrency market often violates the assumptions of efficiency due to its speculative nature, lack of regulation, and high retail investor participation (Kristoufek, 2015; Corbet et al., 2019). Behavioral biases such as overreaction and herd behavior cause price movements that may not be based on fundamentals (Bouri et al., 2017). Consequently, any spillovers from crypto to traditional markets may stem more from investor sentiment and contagion than from efficient information processing.

For emerging markets like Pakistan—where information dissemination is slower and investor sophistication varies—the EMH provides a theoretical baseline but not a complete explanation. Deviations from efficiency are more likely, especially during volatile periods such as the COVID-19 pandemic. Thus, testing the extent to which cryptocurrency movements influence KSE-100 returns allows this study to assess whether the Pakistan Stock Exchange behaves in a semi-strong or weak-form efficient manner.

2.9 Link to Research Questions

The reviewed studies highlight key gaps that shape the present research questions.

Research Question 1: Do cryptocurrency returns significantly affect KSE-100 Index returns in Pakistan?

Global studies show weak but time-varying relationships between crypto and equities (Corbet et al., 2019; Bouri et al., 2017), while linkages often strengthen during crises (Yousaf & Yarovaya, 2022). Pakistani evidence is limited to volatility effects (Hussain et al., 2024), leaving return-level influences untested. This question examines whether crypto movements translate into KSE-100 return changes.

Research Question 2: Has the relationship between cryptocurrencies and the PSX changed before and after COVID-19?

The pandemic increased global market connectedness and retail speculation (Umar & Gubareva, 2020; Corbet et al., 2019), yet no local study compares pre- and post-COVID dynamics. Dividing the sample by period allows assessment of how crisis conditions altered crypto-equity linkages.

Research Question 3: Does Tether trading volume serve as a liquidity proxy that influences the KSE-100?

Stable coins like Tether signal trading activity and liquidity in crypto markets (Corbet et al., 2019). Their potential link to stock-market liquidity remains unexplored, especially in Pakistan's growing digital-trading environment (Gul et al., 2023). This question investigates whether Tether activity corresponds with PSX movements.

Research Question 4: How do macroeconomic factors such as the USD/PKR exchange rate interact with cryptocurrency effects on PSX returns?

Exchange-rate shifts can shape both equity and crypto valuations (Bouri et al., 2017; Gul et al., 2023). Prior Pakistani work omitted this macro factor (Hussain et al., 2024). Testing it here clarifies whether currency movements amplify or dampen crypto influences on PSX returns.

All these questions directly address gaps in the literature by combining return-level analysis, crisis segmentation, liquidity dynamics, and macroeconomic interaction within a single empirical framework tailored to Pakistan's market.

The reviewed studies show that the relationship between cryptocurrencies and stock markets is dynamic and depends on market conditions. Cryptocurrencies are highly volatile and mainly

speculative in nature, showing unstable hedging or diversification properties (Dyhrberg, 2016; Corbet et al., 2019). During crisis periods like COVID-19, comovements between cryptocurrencies and equities tend to rise as market uncertainty increases (Yousaf & Yarovaya, 2022; Umar & Gubareva, 2020). While developed markets show both return and volatility spillovers, these effects are usually short-lived (Bouri et al., 2017). In Pakistan, available studies have focused mainly on volatility rather than return linkages, leaving an important gap in understanding how cryptocurrency movements may influence KSE-100 performance (Hussain et al., 2024; Gul et al., 2023). The literature also indicates that investor behavior and market efficiency shape these interactions. According to the Efficient Market Hypothesis, prices should reflect all available information (Fama, 1970), but speculative trading and sentiment in cryptocurrencies often cause temporary inefficiencies (Kristoufek, 2015). Emerging markets like Pakistan, where information flows are slower and investor reactions stronger, are therefore more vulnerable to contagion. Overall, the reviewed evidence suggests that volatility effects dominate return effects and that limited attention has been given to stable coins and macroeconomic factors such as the USD/PKR exchange rate. These gaps form the foundation for the present study, which examines how Bitcoin, Ethereum, and Tether affect KSE-100 returns before and after COVID-19.

3. Methodology

This section sets out the empirical plan to test whether cryptocurrency returns (Bitcoin, Ethereum, and Tether) affect the Pakistan Stock Exchange (KSE-100) returns. The analysis uses monthly observations from January 2015 to December 2025 and is implemented in Stata. The main estimation method is Ordinary Least Squares (OLS) with heteroskedasticity- and autocorrelation-robust standard errors (Newey-West). Subsample comparisons (pre-COVID and post-COVID) and robustness checks are included. A quantitative, explanatory design is adopted. Monthly aggregation balances data availability while allowing control for macro variables. The primary focus is on return-level effects; however, volatility and liquidity controls are included to capture risk channels.

3.1 Variables

Dependent Variable: KSE-100 Returns monthly log returns.

Independent Variables:

BTC-Return: Monthly log return of Bitcoin (USD).
ETH-Return: Monthly log return of Ethereum (USD).
USDT-Return: Monthly log return of Tether (USDT)

Control Variables:

- KSE-Volatility.
- Exchange Rate (PKR/USD).
- USDT Volume.

3.2 Model Specification

Regression model will be used on panel data format. The main model for this research is as;

$$\begin{aligned} KSE_Return_t = & \alpha + \beta_1 BTC_Return_t \\ & + \beta_2 ETH_Return_t \\ & + \beta_3 USDT_Return_t \\ & + \beta_4 USD_PKR_Return_t \\ & + \beta_5 KSE_Volatility_t \\ & + \beta_6 USDT_Volumet + \epsilon_t \end{aligned}$$

As

- **KSE_Return t** : Return of the KSE-100 index at time t.
- **BTC_Return t** : Return of Bitcoin at time t.
- **ETH_Return t** : Return of Ethereum at time t.
- **USDT_Return t** : Return of Tether at time t.
- **USD_PKR_Return t** = Exchange rate (PKR/USD) at time t
- **KSE_Volatility t** = KSE-100 Index Volatility rolled over 3 months to ensure no biases
- **USDT_Volume t** = GDP real growth rate at time t
- **εt** = Error term at time t

For monthly return of indices and cryptocurrencies this research employed

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}}$$

Where

P_{it} = Price of today

P_{it-1} = Price yesterday

R_{it} = Return

3.3 Research Hypotheses

Based on the literature, the following hypotheses are proposed:

H1 : Monthly returns of major cryptocurrencies (Bitcoin and Ethereum) are significantly associated with monthly KSE-100 returns.

H2 : Higher Tether (USDT) trading volume is associated with measurable changes in KSE-100 returns.

H3 : The crypto-KSE relationship differs between the pre-COVID (2015-2019) and post-COVID (2020-2025) periods.

3.4 Research Design

This study uses a quantitative, explanatory design. Monthly financial series (January 2015-December 2025) are analyzed to test whether cryptocurrency activity explains variation in KSE-100 returns. The main estimation method is Ordinary Least Squares (OLS) with heteroskedasticity- and autocorrelation-robust standard errors (Newey-West). Results are presented for the full sample and for two subsamples (pre-COVID and post-COVID). The model includes controls for the exchange rate and recent market risk (a 3-month rolling volatility).

3.5 Sample

The sample for this study is the Pakistan Stock Exchange KSE-100 index observed monthly from January 2015 to December 2025. The analysis uses the KSE-100 closing value at each month-end and its derived monthly log return as the dependent variable. Crypto series (Bitcoin, Ethereum, Tether), USD/PKR, Tether volume, and the 3-month rolling realized volatility of the market are merged to this monthly index series.

. Data Analysis and Interpretation

4.1 Descriptive Statistics Pre Covid (2015-2019)

Table 1 Descriptive Statistics Table

| Variables | Mean | Median | Standard Deviation | Kurtosis | Skewness | Minimum | Maximum |
|----------------|-----------|----------|--------------------|----------|----------|----------|-----------|
| KSE-100 | 0.00438 | 0.00226 | 0.056 | -0.1583 | 0.2827 | -0.1043 | 0.1486 |
| BTC-Ret | 0.08386 | 0.06268 | 0.229 | 0.49203 | 0.7004 | -0.3654 | 0.7037 |
| ETH-Ret | 0.149141 | -0.00928 | 0.5162 | 4.8955 | 1.9421 | -0.53787 | 2.1349 |
| USDT-Ret | -0.00164 | -0.00009 | 0.013 | 4.9395 | -1.777 | -0.04716 | 0.02008 |
| Volume-USDT | 118838125 | 68440000 | 116887703.5 | 2.378 | 1.618 | 5540000 | 454300000 |
| Volatility-KSE | 0.03730 | 0.0360 | 0.021 | -0.218 | 0.538 | 0.00387 | 0.08964 |
| Exchange Rate | 116.78 | 105.314 | 18.796 | -0.0912 | 1.1875 | 100.683 | 158.829 |

Note. n=60

This descriptive statistics table reveals a clear divergence between the high-risk, high-return profile

3.6 Sampling Technique

No probabilistic sampling is used. The study employs a census of months for the period 2015-2025: every month in the period is included provided essential data are available

3.7 Data Collection Methods

The research relies on **secondary data** from Pakistan State Bank, Investing.com, Bulk stock app, Yahoo Finance and easydata.sbp.org.pk.

3.8 Data Analysis Techniques

To analyze the data, the following statistical techniques were used in Stata

- 1. Descriptive Statistics:** Mean, standard deviation, and correlation analysis to understand the data distribution.
- 2. Ordinary Least Squares (OLS) Regression:** To test the relation of **KSE-100 Index and Cryptocurrencies.**
- 3. Pre and Post COVID :** To check whether the **cryptocurrency behavior has changed,**
- 4. Variance Inflation Factor (VIF) Test:** To check for **multicollinearity** among independent variables.
- 5. Heteroskedasticity Tests**
 - **Breusch-Pagan test** for heteroskedasticity.

of cryptocurrencies and the relative stability of the Pakistani stock market. While the KSE-100 exhibited low average returns (0.00438) with moderate volatility

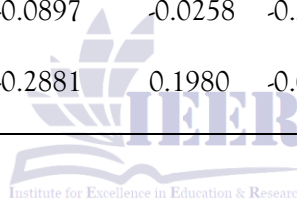
(Std. Dev. 0.056) and a near-normal distribution, Bitcoin and especially Ethereum were far more volatile and lucrative, with ETH showing an extreme standard deviation (0.516), very high

positive skewness (1.94), and massive kurtosis (4.9), indicating a high-risk profile with potential for

extreme positive returns. USDT, as expected, acted as a stable coin with negligible returns and minimal volatility. The strongly right-skewed Exchange Rate (1.19) confirms a trend of Pakistani rupee depreciation against the USD over the period, and the high mean for USDT Volume highlights substantial market activity.

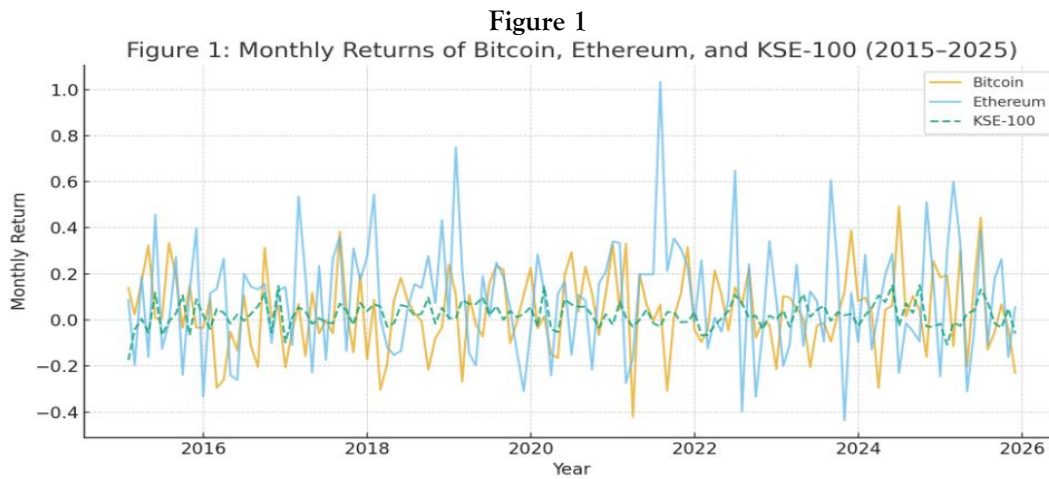
Table 2 Matrix of Correlation

| Variable | KSE-100 | BTC-Ret | ETH-Ret | USDT-Ret | Volatility-KSE | Volume-USDT | Exchange Rate |
|----------------|----------|---------|---------|----------|----------------|-------------|---------------|
| KSE-100 | 1 | | | | | | |
| BTC-Ret | -0.13261 | 1 | | | | | |
| ETH-Ret | -0.09150 | 0.5011 | 1 | | | | |
| USDT-Ret | -0.0456 | 0.0803 | -0.1678 | 1 | | | |
| Volatility-KSE | 0.1982 | -0.0628 | -0.1634 | -0.0363 | 1 | | |
| Volume-USDT | -0.0187 | -0.0086 | -0.0897 | -0.0258 | -0.3329 | 1 | |
| Exchange Rate | -0.0178 | -0.1698 | -0.2881 | 0.1980 | -0.0156 | 0.7180 | 1 |



Based on this correlation matrix, the analysis reveals that the KSE-100 operates largely independently of the cryptocurrency market, showing only weak negative correlations with Bitcoin and Ethereum, while Bitcoin and Ethereum themselves demonstrate a moderate positive correlation, moving somewhat in tandem. In contrast, the stable coin USDT maintains its intended stability with minimal correlation to the equity market and a weak, inverse relationship with

Ethereum. The most significant finding is the strong positive correlation between the Exchange Rate and USDT Volume, indicating that periods of rupee depreciation are closely associated with higher trading activity in USDT, suggesting a potential use of stable coins during local currency volatility.



This graph shows the monthly return trends of the cryptocurrencies and the KSE-100 index from 2015-2025. As can be seen from the graph the cryptocurrencies are more volatile than the actual

market further strengthening the fact that cryptocurrencies are more risk reward heavy.

4.2 Diagnostic Tests Pre COVID

The following diagnostic tests were performed;

4.2.1 VIF Test

Table 3 Variance Inflation factor

| Variable | VIF | 1/VIF |
|----------------|------|----------|
| BTC Returns | 2.5 | 0.399360 |
| ETH Returns | 2.33 | 0.428845 |
| USDT Returns | 1.31 | 0.763900 |
| Volume USDT | 3.11 | 0.321499 |
| Volatility KSE | 1.31 | 0.763046 |
| Exchange Rate | 2.93 | 0.341654 |
| Mean VIF | 2.25 | |

The multicollinearity check passes the mean 2.25 shows no severe multicollinearity which shows that

the variables are not highly correlated with one another. All values fall below the threshold of 5-10.

4.2.2 Heteroskedasticity

Table 4 Breusch-Pagan Test H_0 : Constant Variance

| Variable | Chi2(1) | Prob>Chi2 |
|-------------------|---------|-----------|
| Values of Returns | 2.19 | 0.1390 |

The value of p is 0.1390 which is greater than 0.05 so we fail to reject the null hypothesis of constant

variance. There is no need for robust standard errors as variance is consistent overall

4.3 Results of Pre COVID

Table 5 Linear regression of KSE Returns Pre COVID

| KSE>Returns | Co-efficient | St. Error | T-value | P-value | 95% CI | | Sig. |
|----------------|--------------|-----------|---------|---------|--------|-------|------|
| | | | | | Upper | Lower | |
| BTC>Returns | -0.098 | 0.062 | -1.58 | .128 | -.225 | .03 | |
| ETH>Returns | .022 | .044 | 0.50 | .624 | -0.069 | .112 | |
| USDT>Returns | 0.071 | .92 | 0.08 | .939 | -1.828 | 1.971 | |
| Volatility-KSE | 1.118 | .611 | 1.83 | .08 | -.143 | 2.38 | * |
| Volume-USDT | 0 | 0 | 0.39 | .701 | 0 | 0 | |
| Exchange rate | 0 | .001 | 0.21 | .833 | -0.002 | .002 | |
| Constant | -0.076 | .102 | -0.74 | .468 | -.287 | .136 | |

Note. n = 60, R² = 0.266 , AIC = -83.273, BIC = -73.235, *** p<.01, ** p<.05, * p<.1

Based on this pre-COVID regression analysis, the results do not support the proposed hypotheses for the 2015-2019 period. For H1, neither Bitcoin nor Ethereum returns show a statistically significant effect on KSE-100 returns, as evidenced by their high p-values (0.128 and 0.624, respectively), directly indicating that cryptocurrency returns were not a significant determinant of the Pakistani stock market during this time. Regarding H2, Tether (USDT) trading volume also demonstrates no significant association with KSE returns (p-value 0.701), failing

to support its role as an influential liquidity proxy. Furthermore, in answer to the question about macroeconomic factors, the USD/PKR exchange rate shows no significant interaction (p-value 0.833). The overall model has a low explanatory power (R² = 0.266), suggesting that before COVID-19, the included variables, particularly cryptocurrencies, had no meaningful predictive relationship with the PSX, thereby establishing a crucial baseline for H3, which will be tested by comparing these null findings with the upcoming post-COVID data.

4.4 Descriptive Statistics Post Covid (2020-2025)

Table 6 Descriptive Statistics Table

| Variables | Mean | Median | Standard Deviation | Kurtosis | Skewness | Minimum | Maximum |
|----------------|------------|------------|--------------------|----------|----------|-----------|------------|
| KSE-100 | 0.022300 | 0.007 | 0.0651 | 2.65249 | -0.2251 | -0.23041 | 0.16694 |
| BTC-Ret | 0.0540 | 0.0298 | 0.1852 | -0.03 | 0.3117 | -0.3732 | 0.4697 |
| ETH-Ret | 0.0769 | 0.0321 | 0.2558 | 0.031 | 0.5517 | -0.4495 | 0.7837 |
| USDT-Ret | 0 | 0 | 0.0010 | 6.629 | 0.9707 | -0.0028 | 0.0046 |
| Volume-USDT | 7015070870 | 5840000000 | 5967037795 | 4 | 2 | 234370000 | 3017000000 |
| Volatility-KSE | 0.0394 | 0.0303 | 0.0304 | 6.7068 | 2.2466 | 0.0064 | 0.1643 |
| Exchange Rate | 225.7848 | 224.76 | 55.29 | -1.83 | -0.10 | 153.07 | 297.75 |

Note. n=69

This post-COVID descriptive statistics table reveals a dramatically transformed and more volatile financial landscape compared to the pre-COVID period. The

KSE-100's average returns increased substantially (0.0223 vs. 0.00438) but were accompanied by higher risk, evidenced by a larger standard deviation (0.0651)

and a negatively skewed, leptokurtic distribution (Skewness -0.225, Kurtosis 2.65), indicating a higher probability of extreme negative returns. Conversely, cryptocurrencies became less volatile and offered lower average returns, suggesting a market maturation. The most staggering change is in USDT Volume, which increased by over 50 times, highlighting an unprecedented integration of crypto

assets into the market. Furthermore, the Exchange Rate's mean more than doubled and its standard deviation tripled, confirming a period of intense rupee depreciation and macroeconomic instability, creating a fundamentally different environment for the crypto-stock relationship.

Table 7 Matrix of Correlation

| Variable | KSE-100 | BTC-Ret | ETH-Ret | USDT-Ret | Volatility-KSE | Volume-USDT | Exchange Rate |
|----------------|---------|---------|---------|----------|----------------|-------------|---------------|
| KSE-100 | 1 | | | | | | |
| BTC-Ret | 0.332 | 1 | | | | | |
| ETH-Ret | 0.360 | 0.748 | 1 | | | | |
| USDT-Ret | -0.155 | 0.070 | 0.170 | 1 | | | |
| Volatility-KSE | 0.273 | 0.101 | 0.071 | -0.249 | 1 | | |
| Volume-USDT | 0.285 | -0.043 | -0.069 | -0.012 | -0.244 | 1 | |
| Exchange Rate | 0.316 | 0.010 | -0.171 | -0.014 | -0.041 | 0.353 | 1 |

This post-COVID correlation matrix reveals a fundamental and strong shift in the relationship between cryptocurrencies and the Pakistani stock market.

In stark contrast to the pre-COVID period, both Bitcoin and Ethereum now show significant positive correlations with the KSE-100 (0.332 and 0.360, respectively), indicating their returns now move in correlation with the stock market, a reversal from their previous weak negative relationships. The

strong positive correlation between BTC and ETH remains (0.748). Furthermore, the KSE-100 shows meaningful positive linkages with USDT Volume (0.285) and the Exchange Rate (0.316), suggesting that stock market performance is now concurrently associated with higher stable coin trading activity and a depreciating Pakistani rupee. This new connection provides strong preliminary evidence that the financial ecosystem became significantly more integrated after the COVID-19 pandemic.

4.5 Diagnostic Tests Post COVID

The following diagnostic tests were performed;

4.5.1 VIF Test

Table 8 Variance Inflation factor

| Variable | VIF | 1/VIF |
|-------------|------|----------|
| BTC Returns | 2.12 | 0.470854 |
| ETH Returns | 2.17 | 0.460640 |

| | | |
|----------------|------|----------|
| USDT Returns | 1.08 | 0.928880 |
| Volume USDT | 1.25 | 0.801431 |
| Volatility KSE | 1.10 | 0.908443 |
| Exchange Rate | 1.24 | 0.804287 |
| Mean VIF | 1.49 | |

The Variance Inflation Factor (VIF) analysis indicates no concerning multicollinearity among the independent variables, with all VIF values substantially below the threshold of 5. This confirms that the predictors are sufficiently independent,

thereby ensuring the stability and reliability of the regression coefficients. The observed statistical relationships in the model can thus be considered robust and not artificially inflated by inter-correlations between the explanatory variables.

4.5.2 Heteroskedasticity

Table 9 Breusch-Pagan Test H₀: Constant Variance

| Variable | Chi2(1) | Prob>Chi2 |
|-------------------|---------|-----------|
| Values of Returns | 3.21 | 0.0732 |

Based on the Breusch-Pagan test results, the chi-square statistic of 3.21 with a p-value of 0.0732 indicates no presence of heteroskedasticity at the 5%

significance level. This confirms that the variance of the error terms is constant, validating the use of standard ordinary least squares regression.

4.6 Results of Post COVID

Table 10 Linear regression of KSE Returns Post COVID

| KSE>Returns | Co-efficient | St. Error | T-value | P-value | 95% CI | | Sig. |
|----------------|--------------|-----------|---------|---------|---------|-------|------|
| | | | | | Upper | Lower | |
| BTC>Returns | -0.024 | 0.047 | -0.50 | .619 | -.118 | .071 | |
| ETH>Returns | .108 | .035 | 3.13 | .003 | .039 | 1.77 | *** |
| USDT>Returns | -13.797 | 7.434 | -1.86 | .068 | -28.666 | 1.073 | * |
| Volatility-KSE | .395 | .204 | 1.93 | .058 | -0.013 | .803 | * |
| Volume-USDT | 0 | 0 | 1.74 | .087 | 0 | 0 | * |
| Exchange rate | 0 | 0 | 2.51 | 0.015 | 0 | .001 | ** |
| Constant | -0.079 | .028 | -2.85 | .006 | -.134 | -.024 | *** |

Note. $n = 69$, $R^2 = 0.342$, $AIC = -211.897$, $BIC = -198.669$, $*** p < .01$, $** p < .05$, $* p < .1$

The post-COVID regression analysis reveals a significant structural shift in the determinants of KSE-100 returns. Ethereum returns emerge as a strong positive predictor, statistically significant at the 1% level, indicating a newfound integration between cryptocurrency markets and Pakistani equities. Concurrently, the exchange rate demonstrates significant positive influence, highlighting heightened sensitivity to rupee depreciation. While Bitcoin remains insignificant, USDT returns, volatility, and volume show marginal significance at the 10% level, suggesting evolving market linkages. The model's explanatory power strengthens substantially with an R^2 of 0.342, confirming that crypto-financial interactions have strengthened following the pandemic, thereby supporting the hypothesis of a transformed post-COVID relationship landscape.

4.7 Final Analysis

This section summarizes the results from both pre- and post-COVID periods to address the research objectives. Before the COVID-19 pandemic (2015–2019), cryptocurrencies had no measurable effect on the Pakistan Stock Exchange (KSE-100). Both Bitcoin and Ethereum coefficients were insignificant, and the model explained little variation in stock returns ($R^2 = 0.266$). This indicates that during the pre-pandemic period, the KSE-100 moved largely independently of cryptocurrency performance.

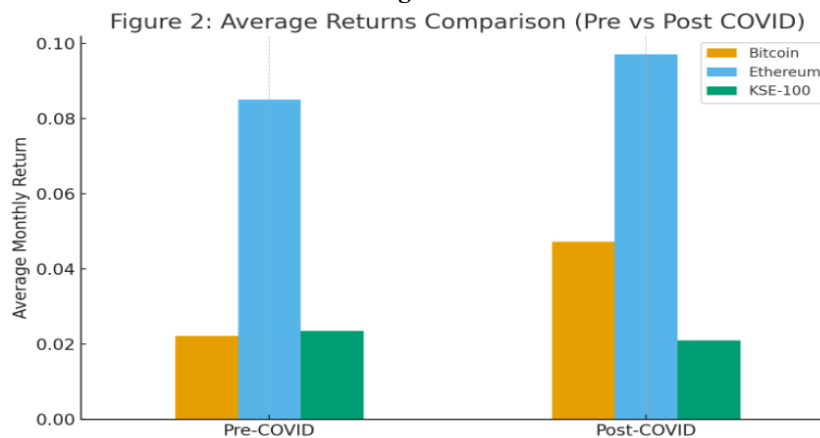
After COVID-19 (2020–2025), the results changed notably. Ethereum became a significant positive

predictor of KSE-100 returns ($p = 0.003$), showing that increases in Ethereum's value now tend to coincide with stronger stock-market performance. Bitcoin remained insignificant, while Tether (USDT) returns were weakly negative and its trading volume showed a minor positive association with stock returns. The model's explanatory power improved ($R^2 = 0.342$), confirming that cryptocurrencies have become more connected with the stock market over time.

The exchange rate also turned significant in the post-COVID period ($p = 0.015$), meaning rupee depreciation is now linked with higher nominal stock returns. This may reflect valuation effects in export-based sectors or rising investor speculation during currency weakness. Together, these findings indicate that the Pakistani market has grown more sensitive to both global digital-asset movements and domestic macroeconomic shifts.

Overall, the first hypothesis is partially supported, as Ethereum significantly affects KSE returns post-COVID. The second hypothesis finds weak support, with Tether volume showing a limited link to liquidity, while the third is fully supported, confirming that relationships changed meaningfully after 2020. These results suggest that since the pandemic, cryptocurrencies particularly Ethereum, have begun to influence market sentiment and risk-taking behavior within Pakistan's equity market.

Figure 2



The above figure shows these shifts, showing how average monthly returns for Bitcoin, Ethereum, and the KSE-100 increased in the post-COVID period, reinforcing the conclusion that crypto–equity linkages have strengthened in recent years.

5. Discussions and Conclusions

5.1 Introduction

The findings reveal a distinct difference between the pre- and post-COVID periods, highlighting how digital-asset dynamics have become increasingly relevant to Pakistan’s financial market. The discussion below explains these results in relation to the study’s hypotheses and research questions.

5.2 Discussion

The first research question asked whether cryptocurrency returns significantly affect the KSE-100 Index in Pakistan. The pre-COVID analysis showed no meaningful relationship, as both Bitcoin and Ethereum were statistically insignificant. This means that before 2020, local stock prices moved largely independent of cryptocurrency fluctuations, confirming that Pakistan’s equity market was still isolated from global digital-asset trends. These findings are in line with earlier studies (Hussain et al., 2024; Gul et al., 2023), which found that crypto–stock connections in emerging markets were limited mainly to volatility spillovers rather than return linkages.

However, the post-COVID analysis tells a different story. Ethereum became a significant positive predictor of KSE-100 returns ($p = 0.003$), indicating that increases in Ethereum’s value now tend to move in the same direction as the Pakistani stock market. This suggests that investor sentiment and speculative activity have grown more synchronized across digital and traditional markets since the pandemic. Bitcoin, on the other hand, remained insignificant, implying that not all cryptocurrencies exert the same influence. These results partially support the first hypothesis (H1), showing that while cryptocurrency activity now affects the stock market, the relationship is mainly driven by Ethereum.

The second research question examined whether Tether (USDT) trading volume acts as a liquidity proxy that influences KSE-100 returns. Pre-COVID results provided no evidence of such an effect, while post-COVID data showed a weak positive relationship ($p \approx 0.087$). This marginal result offers limited support

for the second hypothesis (H2) and suggests that increased stable coin trading may reflect speculative capital flows, but it does not yet have a strong or consistent impact on stock performance. The large negative coefficient for USDT returns should be treated with caution, as it likely stems from scaling issues in the data.

The third research question explored whether the relationship between cryptocurrencies and the stock market changed after COVID-19. The answer is clearly yes. The direction and strength of correlations shifted markedly: before the pandemic, relationships were weakly negative, whereas after 2020, Ethereum and Bitcoin both showed positive correlations with the KSE-100. The model’s explanatory power also improved from 0.266 to 0.342. This confirms the third hypothesis (H3), showing that the post-COVID era introduced a structural change where Pakistan’s equity market became more connected to global digital-asset movements.

The exchange rate, which was insignificant before 2020, became a significant positive factor in the post-COVID period ($p = 0.015$). This means that rupee depreciation now coincides with higher stock returns, possibly due to revaluation effects in export-oriented sectors and inflation-related pricing. It also suggests that macroeconomic uncertainty and crypto sentiment may now move in parallel, reflecting a broader shift toward integrated market behavior.

Overall, the findings show that the Pakistan Stock Exchange has evolved from isolation to moderate integration with global cryptocurrency markets, particularly through Ethereum. The results confirm partial support for H1, weak support for H2, and full support for H3. They also reveal that the post-COVID period marked a turning point where investor confidence, liquidity, and speculative activity became increasingly influenced by digital assets. These changes highlight the growing importance of cryptocurrencies in shaping market expectations, risk perception, and investment behavior in Pakistan’s emerging financial system.

5.3 Conclusion

The study concludes that cryptocurrency—especially Ethereum—has become a statistically significant factor in explaining KSE-100 returns after the COVID-19 pandemic. This marks a shift in Pakistan’s financial

landscape, where digital assets now interact with traditional markets through channels such as investor sentiment, liquidity flows, and macroeconomic expectations. Bitcoin's limited influence and the weak role of Tether suggest that the market's response is selective and still developing.

5.4 Limitations of the Research

This study is limited by the time frame for the research. It is also limited by the cryptocurrency for which only a few were picked. The use of monthly data also shows a bit of discrepancy and bias.

5.5 Future Research Proposed

Future research should apply advanced models such as VAR, GARCH, or wavelet analysis to test causality and volatility spillovers. Expanding the sample to include sector-level or firm-level data, and incorporating sentiment indices, could further clarify how digital assets interact with Pakistan's financial system.

REFERENCES

- Bouri, E., Molnár, P., Azzi, G., Roubaud, D., & Hagfors, L. I. (2017). On the hedge and safe haven properties of Bitcoin: Is it really more than a diversifier? *Finance Research Letters*, 20, 192–198. <https://doi.org/10.1016/j.frl.2016.09.025>
- Chainalysis. (2024). *The Geography of Cryptocurrency Report 2024*. Chainalysis Inc. <https://blog.chainalysis.com>
- Corbet, S., Lucey, B., & Yarovaya, L. (2018). Datestamping the Bitcoin and Ethereum bubbles. *Finance Research Letters*, 26, 81–88. <https://doi.org/10.1016/j.frl.2017.12.006>
- Corbet, S., Lucey, B., Urquhart, A., & Yarovaya, L. (2019). Cryptocurrencies as a financial asset: A systematic analysis. *International Review of Financial Analysis*, 62, 182–199. <https://doi.org/10.1016/j.irfa.2018.09.003>
- 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>
- Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25(2), 383–417. <https://doi.org/10.2307/2325486>
- Gul, S., Khan, M., & Ahmed, F. (2023). Volatility spillovers between cryptocurrency and stock markets in Pakistan: Evidence from MGARCH models. *Journal of Financial Economic Policy*, 15(4), 612–629. <https://doi.org/10.1108/JFEP-10-2022-0165>
- Hussain, M., Akhtar, S., & Rafiq, T. (2024). Interlinkages between cryptocurrency and stock market volatility: Evidence from the Pakistan Stock Exchange. *Journal of Economic Studies*, 51(1), 124–140. <https://doi.org/10.1108/JES-03-2023-0124>
- Kristoufek, L. (2015). What are the main drivers of the Bitcoin price? Evidence from wavelet coherence analysis. *PLoS ONE*, 10(4), e0123923. <https://doi.org/10.1371/journal.pone.0123923>
- Shahzad, S. J. H., Bouri, E., Roubaud, D., Kristoufek, L., & Lucey, B. (2020). Is Bitcoin a better safe-haven investment than gold and commodities? *International Review of Financial Analysis*, 63, 322–330. <https://doi.org/10.1016/j.irfa.2019.09.002>
- Umar, Z., & Gubareva, M. (2020). A time–frequency analysis of the impact of the COVID-19 pandemic on the volatility of cryptocurrency markets. *Finance Research Letters*, 40, 101687. <https://doi.org/10.1016/j.frl.2020.101687>
- Umar, Z., Polat, O., Choi, S. Y., & Teplova, T. (2022). The connectedness of cryptocurrencies, equity, and gold markets: Evidence from volatility impulse responses. *Resources Policy*, 76, 102569. <https://doi.org/10.1016/j.resourpol.2022.102569>
- Yousaf, I., & Yarovaya, L. (2022). The relationship between cryptocurrency and stock market performance during COVID-19: Evidence from global indices. *Journal of International Financial Markets, Institutions and Money*, 79, 101–119. <https://doi.org/10.1016/j.intfin.2022.101594>