CRISIS-DRIVEN CALENDAR ANOMALIES:
Day-of-the-Week Effects in Bitcoin and Ethereum Returns During Global Conflicts (2019–2024)

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ABSTRACT

This study attempt to investigate the Day-of-the-Week (DOW) effect on the returns of cryptocurrency, with a major focus the Bitcoin and Ethereum, during three major global crises viz., the COVID-19 pandemic, the Russia-Ukraine conflict, and the Palestine-Israel war. With the application of GARCH (1,1) models with day-dummy variables on the daily price data from December 2019 to January 2024, it also examine the temporal return patterns across weekdays. The findings reveal that although the magnitude and significance vary across crises, yet there is presence of consistent DOW effect, with Bitcoin and Ethereum unveiling elevated returns on specific weekdays, particularly at the beginning and mid of the week. During COVID-19 pandemic, both the cryptocurrencies shows significant positive returns on Mondays and Wednesdays, reflect the delicate market sensitivity and investors' activity amid global uncertainty. During Russia-Ukraine conflict, the Bitcoin exhibit the gains during mid-week, while Ethereum shows the limited effects. Likewise, during the Palestine-Israel conflict, Bitcoin shows the significantly higher returns on Monday and Wednesday on the other hand the Ethereum shows the moderate effects. These findings indicate that external shocks and crisis have impact on the temporal return patterns, which challenge the efficient market hypothesis. It also shows that the return in the Bitcoin is more consistently influenced by DOW patterns than

Ethereum across crises, proposing strategic and tactical insights for investors to leverage weekday effects.

Keywords: Bitcoin, Ethereum, COVID-19, Russia-Ukraine Conflict, Palestine-Israel War

JEL classification: G12, G14, C22

1. Introduction

Financial markets across globe demonstrate systematic patterns in the return of the assets, which deviate from the likelihoods of the Efficient Market Hypothesis (EMH). The day-of-the-week (DOW) effect is the most persistent form of calendar anomalies, which suggests that asset returns differ surely across weekdays. The empirical evidence of extensive research in the equity markets shows that surely few days consistently generate abnormal returns or volatility, poses the challenge for the assumption of informational efficiency and support behavioural explanation of investors' decision-making (Berument & Kiymaz, 2001; Rossi, 2015; Latif et al., 2011). Further, the research carried across developed as well as emerging markets confirm that these anomalies are neither constant nor steady. However, these anomalies progress over time in response to market structure, liquidity, and institutional dynamics (Guidi et al., 2011; Rodriguez, 2012; Ferrouhi et al., 2021).

The rapid advent of cryptocurrencies has brought a new asset with eccentric characteristics, including decentralization, fast trading with extensive volatility, and strong speculative participation. Such features make the cryptocurrencies particularly suitable for the re-examination of the traditional market anomalies across unusual trading environments. Observed evidence specifies that the cryptocurrencies do not always imitate to weak-form efficiency, as the several studies supporting the presence of DOW effects in digital asset returns (Aharon & Qadan, 2019; Caporale & Plastun, 2019; Dangi, 2020). Unlike orthodox financial markets, cryptocurrency markets function without any closing hours and globally integrated too. This shows that the weekday-based return patterns are majorly motivated by the behavioural sentiment, flow of information, and liquidity cycles than institutional trading constraints (Lee et al., 2017; Milutinovic, 2018). Although the early cryptocurrency studies largely focused on Bitcoin, the present research highlight the importance of extending analysis to other major cryptocurrencies

such as Ethereum so as to capture the heterogeneity in behaviour of market. Evidence suggests that calendar anomalies as well as volatility dynamics may vary significantly across cryptocurrencies, depicting variations in market maturity, investors' base, and technological structure (Naz et al., 2023; Nur & Dewangkara, 2021). Further, the Adaptive Market Hypothesis (AMH) extend a valuable outline for understanding the evolution of anomalies across varying market conditions as well as time, highlighting that market efficiency is not static rather adapts to the changing dynamics of the environments (Adaramola & Adekanmbi, 2020).

Further, the global crisis and events muddle the behaviour of financial markets with the extensive uncertainty, volatility, and spillover across markets. The COVID-19 pandemic, the Russia-Ukraine war, and the Palestine-Israel conflict symbolize overlapping incidents of economic, financial, and geopolitical tension that have strongly affected the price of assets across world. The results by existing literature demonstrates that the crises have significantly transformed the volatility, connectedness, and risk transmission in the cryptocurrency market (Umar & Gubareva, 2020; Taera et al., 2023; Khalfaoui et al., 2023). Across such periods, the distributions of returns tend to reveal time varying volatility as well as bunching. Hence, it justify the application of GARCH models to capture all such dynamics (Kaur, 2004; Anandhabalaji et al., 2023).

Despite growing scholarly interest in the cryptocurrencies under crisis circumstances, limited consideration extended to identify the behaviour of weekday based return anomalies across varying geopolitical regimes, particularly after the COVID-19 pandemic. Majorly the existing studies examined either the single crisis or normal market conditions. Hence, left gap to understand the presence and persistence of DOW effect, weakens, or transforms during protracted and consecutive global shocks (Bolek et al., 2023; Kamal & Wahlstrøm, 2023). Addressing this gap become imperative in the light of increasing role of cryptocurrencies as speculative assets and budding hedging instruments during periods of uncertainty and insecurity.

Consequently, the present study attempt to investigate the persistence and evolution of the day-of-the-week (DOW) effect in the major cryptocurrency markets namely Bitcoin and Ethereum, across three major global crises viz., COVID-19 pandemic, the Russia-Ukraine conflict, and the Palestine-Israel

crisis. The present research attempt to contribute to the existing body of knowledge in the area of crisis sensitive evidence on calendar anomalies in cryptocurrencies, with the integration of temporal and geopolitical dimensions with a cohesive GARCH framework. Hence, it extend the relevance of the Adaptive Market Hypothesis to the cryptocurrency to enhance understanding of investors' behaviour, market efficiency, and dynamics of return under sustained global uncertainty.

The study is structured as follows: section 2 presents the literature review and hypotheses development; section 3 provides deep insight on the research methodology; section 4 gives the analysis of the results; section 5 discusses the findings; and section 5 presents the conclusion.

2. Literature Review and Hypotheses Development

In the traditional financial markets, the calendar anomalies such as the day-of-the-week (DOW) effect have been widely explored, provides that the asset returns may exhibit predictable temporal patterns, which are generally inconsistent with market efficiency. Guidi et al. (2011) examined weak-form market efficiency as well as calendar effects, demonstrated that these anomalies contest the hypothesis of weak-form efficiency. More explicitly, they identified the January effect, meaning that the stock returns tend to be higher in January as compared to other months. Similarly, Rossi (2015) reviewed as well as carried study on the calendar anomalies and highlighted that such patterns lay doubt on the efficiency of the market by revealing systematic variations in the returns across specific days or periods. Various empirical studies on the stock markets have applied a wide range of GARCH-family models to identify and measure anomalies, with the use of day-dummy variables to capture the effects of weekday (Kaur, 2004; Rodriguez, 2012; Perez, 2017; Ferrouhi et al., 2021; Samaniego et al., 2022).

Further extending such examinations to the digital assets, numerous studies have confirmed the existence of the DOW effect in the cryptocurrency market. The presence of return as well as volatility patterns have been confirmed with the application of GARCH family models along with day-dummy specifications to explore the systematic variations in the weekdays (Dangi, 2020; Caporale & Plastun, 2019; Naz et al., 2023). Cryptocurrencies, as

enumerated by Nubika (2018), denote to a group of mathematically accumulated codes and symbols that manufacture virtual currencies. In other words, such currency is majorly based on cryptography and algorithms. In addition, the key features comprise of security as well as decentralization from the centralized authorities. As noted by the Milutinovic (2018), the probability of the transactions being visible is extremely low. Blockchain, is the foundational technology used in the cryptocurrencies, used to enhance the security and is progressively adopted in non-monetary domains viz., healthcare, voting, and distributed storage (Lee et al., 2017). It is evident that the cryptocurrencies are gaining popularity as an investment asset class, researchers too began to explore the price behaviour and developing machine learning models to predict price movements (Krause & Tolaymat, 2018).

In the cryptocurrencies, DOW effect and related volatility dynamics have been explored under crisis conditions, when markets explicitly exhibit amplified inefficiencies. During COVID-19 pandemic, the cryptocurrency market practised noticeable volatility and weak-form of efficiency (Fu et al., 2024; Al-Shboul, 2024). Asiri et al. (2023) explored the relationship between returns and volatility of the financial assets during COVID-19, provides that the uncertainty in the cryptocurrencies rushed radically, spreading shocks to other markets too. Anandhabalaji et al. (2023) concluded a positive correlation, stationary distribution, as well as non-normality in the returns of cryptocurrency during the same period, highlighting variability under crisis conditions. Likewise, Umar and Gubareva (2020) examined the effect of COVID-19 on the volatility of virtual currency and cryptocurrency market with the application of time frequency approach. The findings offer valuable insights into market fluctuations rises because of crisis.

With due consideration of the strands of literature, the present study attempt to extend the examination of calendar anomalies to major global crises. More specifically the major focus is on the investigation of the persistence and variation of the DOW effect in the cryptocurrency markets. Although the prior studies established the weekday anomalies and volatility clustering in both traditional as well as crypto markets, limited attention observed on the influence of successive geopolitical stress and related crises. Hence, this study provides a comparative perspective on the crisis-induced uncertainty and investors' sentiment role in shaping temporal return patterns in the crypto

market. For this, the analysis of return of Bitcoin and Ethereum across the COVID-19 pandemic, the Russia-Ukraine conflict, and the Palestine-Israel war are considered. Using GARCH models with day-dummy specifications, the research contributes to understanding of market inefficiencies in digital assets in response to the global shocks or structural features inherent to cryptocurrencies.

The hypothesis in relation to the COVID-19 period that examine the calendar anomalies in the cryptocurrency market is as:

H_1: The cryptocurrency market had a DOW effect during the COVID-19 period.

Kamal and Wahlstrom (2023) studied how the cryptocurrency market responded to two incidents in February 2022 during the intensification of the conflict between Russia and Ukraine and found that a decline in cryptocurrency returns and liquidity was linked to both the threat and act occurrences. Taera et al. (2023) studied the external shock and volatility in the financial assets during the pandemic of COVID-19 as well as the conflict in Russia and Ukraine. The study revealed that in almost all of these assets had increased volatility. Khalfaoui et al. (2023) suggested using quantile dependence analysis that the Russia-Ukraine war significantly influenced the dynamics of cryptocurrency markets. These finding highlights the interconnectedness between the geopolitical events and the digital financial markets. Taking reference from the literature, the second hypothesis, for the Russia-Ukraine War period, is:

H_2: The cryptocurrency market had a DOW effect during the Russia-Ukraine War.

No studies discuss the cryptocurrency market or calendar anomalies during the Palestine-Israel War period. Hence, the third hypothesis, for the Palestine-Israel war period, is:

H_3: The cryptocurrency market had a DOW effect during the Palestine-Israel War

3. Research Methodology

In order to achieve the objective of the study, the daily prices of the top two cryptocurrencies (Bitcoin and Ethereum) based on market capitalization were collected from 31st December 2019 to 31st January 2024 (the number of observations was 1492 days, starting from the COVID-19 reported day to the end of January 2024). There are three sub-periods during the research period under consideration: COVID period, from 31st December 2019 to 31St March 2022; Russia-Ukraine War period from 24th February 2022 to 31st January 2024; and Palestine-Israel War period from 7th October 2023 to 31st January 2024.

The top two cryptocurrencies that have the largest market capitalization (Bitcoin and Ethereum) are used as samples in the present study. The study's dependent variable is the price returns of the cryptocurrencies under consideration. The daily returns calculation is done using the equation (Caporale & Plastun, 2019; Dangi, 2020; Naz et al., 2023): $RC_t = \frac{P_t - P_{t-1}}{P_{t-1}}$

where:

RC_t	=	Return of the cryptocurrency in period t;
P_t	=	Cryptocurrency price in period t;
P_{t-1}	=	Cryptocurrency closing price in the previous period period t-1

The stationarity of the time series data is ascertained using the Augmented Dickey-Fuller (ADF) test. Time series data's autocorrelation function (ACF) or partial autocorrelation function (PACF) can be found using the correlogram test.

To forecast the DOW effect, the collected data is analysed using the GARCH (1,1) model, which is a popular econometric model for predicting and simulating time series data volatility, especially in financial markets (Adaramola & Adekanmbi, 2020; Truong & Friday, 2021; Kaur, 2004).

Equations used for testing day-of-the-week-effect

We investigate the existence of the DOW effect in the cryptocurrency market using the following equation (Bolek et al., 2023; Naz et al., 2023; Nur & Dewangkara, 2021):

$$RC_t = \beta_1 MON_t + \beta_2 TUE_t + \beta_3 WED_t + \beta_4 THU_t + \beta_5 FRI_t + \beta_6 SAT_t + \beta_7 SUN_t + \varepsilon_t$$

where:

RCt	=	return cryptocurrency in period day t
$\beta_1 MON_t$	=	dummy variable on Monday;
$\beta_2 TUE_t$	=	dummy variable on Tuesday;
$\beta_3 WED_t$	=	dummy variable on Wednesday;
$\beta_4 THU_t$	=	dummy variable on Thursday;
$\beta_5 FRI_t$	=	dummy variable on Friday;
$\beta_6 SAT_t$	=	dummy variable on Saturday;
$\beta_7 SUN_t$	=	dummy variable on Sunday.
ε_t	=	error term

4. Analysis of Results

The section present the empirical findings, which are derived from the application of statistical and econometric tools to the returns of Bitcoin and Ethereum across the distinctive crisis periods. In order to uncover the presence of day-of-the-week effects and market dynamics during global disruptions, analytically interprets descriptive statistics, stationarity, autocorrelation, and volatility models.

Table 1 summarizes the descriptive characteristics of Bitcoin and Ethereum daily returns across three major crisis periods viz., the COVID-19 pandemic, the Russia-Ukraine war, and the Palestine-Israel conflict. Notable volatility reported by the results in both the cryptocurrencies, as the higher standard deviations seen during the pandemic phase, which indicate deepened uncertainty in the market. Bitcoin and Ethereum return exhibited negative skewness during COVID-19 as well as Russia-Ukraine war, proposing a tendency toward additional extreme losses. On the other hand, the positive skewness during the Palestine-Israel conflict denotes sporadic large gains. The high kurtosis values witnessed particularly during the COVID-19 pandemic

indicate heavy-tailed distributions along with the presence of extreme variations. The Jarque-Bera statistics across all periods endorse the not normal distribution of returns, which highlight that the presence of market inefficiency during blustery times. Largely, these findings recommend that the global crises amplify volatility, distort return regularity, as well as intensify the deviations from normality in cryptocurrency markets. In addition, the Ethereum generally showing greater variability in comparison to the Bitcoin.

Table 1: Descriptive Statistics of Daily Return

Criteria	COVID-19 Pandemic	Russia-Ukraine War	Palestine-Israel Conflict
Bitcoin			
Mean	0.003074	0.000599	0.003344
Median	0.002255	-0.000732	0.001528
Maximum	0.194137	0.145907	0.101974
Minimum	-0.391816	-0.156290	-0.075781
Std. Dev.	0.040253	0.028549	0.025523
Skewness	-0.836964	-0.121930	0.240991
Kurtosis	15.58177	7.905989	5.412798
Jarque-Bera	5517.777	710.7764	29.51277
Observations	822	707	117
Ethereum			
Mean	0.005357	0.000474	0.003176
Median	0.004487	-0.000238	0.001378
Maximum	0.259572	0.184565	0.122199
Minimum	-0.445472	-0.175555	-0.061895
Std. Dev.	0.052738	0.035886	0.027704
Skewness	-0.578314	-0.003926	0.949575
Kurtosis	12.05332	7.532231	6.349773
Jarque-Bera	2853.039	605.1088	72.28528
Observations	822	707	117

Source: Authors.

Table 2 shows the average daily returns of Bitcoin and Ethereum across three major crisis viz., the COVID-19 pandemic, the Russia–Ukraine war, and

the Palestine–Israel conflict. It demonstrate the existence as well as variation of the DOW effect during the crisis periods under consideration. Both the cryptocurrencies recorded their highest returns on Wednesdays (0.0077 for Bitcoin and 0.0102 for Ethereum) during the COVID-19 pandemic. This indicate the mid-week optimism prevailing among the investors, possibly due to the positive trading sentiment and higher liquidity in the cryptocurrency market. However, the negative returns on Thursdays for both assets suggest a short-term correction in the market followed by early-week rallies.

During the Russia-Ukraine war period, average returns were considerably lower and less volatile too, demonstrating that passive investors' activity amidst heightened geopolitical uncertainty. Bitcoin's slightly positive returns on Mondays and Tuesdays, which are in contrast with marginally negative results later part of the week, reflecting cautious and rational trading behaviour. During the Palestine-Israel conflict, Bitcoin exhibited remarkably higher returns on Mondays and Wednesdays, whereas return in the Ethereum were peaked mid-week but practiced a decline on Tuesdays. It indicate the effect of divergent short-term market responses during crisis. In all, the results shown that the DOW pattern persisted but weakened too under the geopolitical uncertainties. The magnitude of returns was highest during the COVID-19 pandemic. On the other hand, the magnitude was found lowest during the Russia-Ukraine war, confirming that global crises ominously influence trading cycles and investors' sentiment in cryptocurrency markets.

Table 2: Average Daily Return Analysis

Cryptocurrency	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
COVID-19 PANDEMIC							
Bitcoin	0.0074	0.0037	0.0077	-0.0014	0.0027	0.0018	-0.0003
Ethereum	0.0093	0.0052	0.0102	-0.0009	0.0035	0.0067	0.0039
RUSSIA-UKRAINE WAR							
Bitcoin	0.0019	0.0028	0.00157	-0.0021	-0.0007	-0.0000	0.0004
Ethereum	0.00028	0.0005	0.00123	0.00116	0.00116	-0.0003	-0.0007
PALESTINE-ISRAEL CONFLICT							
Bitcoin	0.0160	0.0008	0.0099	-0.0046	0.0034	0.0024	-0.0010
Ethereum	0.0063	-0.0057	0.0106	0.0090	0.0010	0.0027	-0.0010

Source: Authors.

Table 3 reports the Augmented Dickey-Fuller (ADF) unit root test results for Bitcoin and Ethereum across the three crisis periods. The highly negative t-statistics, corresponding p-value (0.0000) specify that the null hypothesis of a unit root is rejected at the 1% significance level. This confirms that the return series of both the cryptocurrencies under consideration were stationary throughout the COVID-19 pandemic, the Russia-Ukraine war, and the Palestine-Israel conflict. Stationarity implies that the mean and variance remain constant over time, making the data suitable for further econometric modelling, such as GARCH-based volatility analysis.

Table 3: Result of Unit Root Test

Cryptocurrency	COVID-19 Pandemic	Russia-Ukraine War	Palestine-Israel Conflict
Bitcoin			
t-value	-31.6032	-27.2538	-13.8041
Prob.*	0.0000	0.0000	0.0000
Ethereum			
t-value	-31.96842	-13.93935	-8.852749
Prob.*	0.0000	0.0000	0.0000

Source: Authors

Table 4 shows the autocorrelation as well as partial autocorrelation results for return of Bitcoin and Ethereum during the three crisis periods. The existence of significant autocorrelation coefficients along with low p-values across several lags demonstrate the influence of past returns on the current returns. This violates the assumption of the weak-form efficiency, concluding that returns are not always only random. In addition, the effect is found more noticeable during the Russia-Ukraine conflict as well as the Palestine-Israel war, reflecting persistent volatility clustering in the market. These findings validate the applicability of the GARCH family models to capture dynamic volatility behaviour in cryptocurrency markets amid diverse crisis.

Table 4: Correlogram Test

Bitcoin							Ethereum						
COVID-19 Pandemic													
Auto Correlation	Partial Correlation		AC	PAC	Q-Stat	Prob	Auto correlation	Partial Correlation		AC	PAC	Q-Stat	Prob
*| |	*| |	1	-0.099	-0.099	8.1234	0.004	*| |	*| |	1	-0.111	-0.111	10.185	0.001
.| |	.| |	2	0.037	0.027	9.2375	0.010	.| |	.| |	2	0.056	0.045	12.811	0.002
.| |	.| |	3	-0.042	-0.036	10.687	0.014	.| |	.| |	3	-0.050	-0.040	14.901	0.002
.|* |	.|* |	4	0.091	0.083	17.507	0.002	.|* |	.|* |	4	0.093	0.082	22.079	0.000
.| |	.| |	5	-0.011	0.008	17.611	0.003	*| |	.| |	5	-0.081	-0.060	27.489	0.000
.| |	.| |	6	0.034	0.028	18.558	0.005	.| |	.| |	6	0.068	0.046	31.354	0.000
.| |	.| |	7	-0.047	-0.036	20.400	0.005	.| |	.| |	7	-0.023	0.000	31.808	0.000
Russia-Ukraine War													
Auto correlation	Partial Correlation		AC	PAC	Q-Stat	Prob	Auto correlation	Partial Correlation		AC	PAC	Q-Stat	Prob
****|. |	****|. |	1	-0.537	-0.537	204.32	0.000	****|. |	****|. |	1	-0.541	-0.541	207.16	0.000
.|. |	**|. |	2	0.048	-0.337	205.98	0.000	.|. |	***|. |	2	0.028	-0.374	207.70	0.000
.|. |	**|. |	3	0.014	-0.209	206.13	0.000	.|. |	*|. |	3	0.058	-0.203	210.11	0.000
.|. |	**|. |	4	-0.050	-0.212	207.93	0.000	*|. |	**|. |	4	-0.075	-0.209	214.10	0.000
.|. |	*|. |	5	0.045	-0.145	209.40	0.000	.|. |	*|. |	5	0.033	-0.175	214.86	0.000
.|. |	*|. |	6	-0.030	-0.140	210.05	0.000	.|. |	*|. |	6	0.027	-0.097	215.38	0.000
.|. |	*|. |	7	0.029	-0.088	210.66	0.000	.|. |	.|. |	7	-0.022	-0.061	215.71	0.000

Palestine-Israel Conflict														
Auto correlation	Partial Correlation		AC	PAC	Q-Stat	Prob	Auto Correlation	Partial Correlation		AC	PAC	Q-Stat	Prob
****|. |	****|. |	1	-0.542	-0.542	34.981	0.000	****|. |	****|. |	1	-0.542	-0.542	35.004	0.000
.|. |	***|. |	2	0.041	-0.359	35.178	0.000	.|. |	***|. |	2	0.020	-0.388	35.054	0.000
.|. |	*|. |	3	0.045	-0.195	35.419	0.000	.|. |	**|. |	3	0.070	-0.208	35.647	0.000
.|. |	*|. |	4	-0.045	-0.160	35.670	0.000	*|. |	**|. |	4	-0.093	-0.239	36.713	0.000
.|. |	.|. |	5	0.048	-0.066	35.956	0.000	.|. |	**|. |	5	0.031	-0.231	36.835	0.000
*|. |	*|. |	6	-0.077	-0.130	36.696	0.000	.|* |	.|* |	6	0.158	0.077	39.958	0.000
.|. |	*|. |	7	0.061	-0.077	37.164	0.000	**|. |	*|. |	7	-0.237	-0.088	47.018	0.000

Source: Authors

Table 5 demonstrate the GARCH (1,1) model results which shows the DOW effect in Bitcoin and Ethereum returns during three global crises under consideration. During the COVID-19 pandemic, significant positive coefficients for Monday and Wednesday in both cryptocurrencies indicate higher average returns at the beginning and mid-week, suggesting optimism-driven trading behaviour. During the Russia–Ukraine conflict, the DOW pattern weakened, with only Tuesday showing marginal significance for Bitcoin and Ethereum. The strong GARCH terms highlight continued volatility clustering, though less intense than in the pandemic period. During the Palestine–Israel conflict, Bitcoin exhibited pronounced Monday and Wednesday effects, whereas Ethereum showed weaker and mostly insignificant day effects. This implies that investor reactions were concentrated early in the week, possibly reflecting rapid information assimilation and market adjustments.

Table 5: GARCH (1,1) test for the examination of the day-of-the-week-effect

	Bitcoin		**Ethereum**	
Dependent Variable: Returns during COVID-19				
Variables	Coefficient	Prob.	Coefficient	Prob.
Monday	0.009680***	0.0017	0.008442**	0.0415
Tuesday	0.003583	0.3321	0.004025	0.3203
Wednesday	0.007788**	0.0193	0.013281***	0.0008
Thursday	-0.005191	0.1029	-0.001237	0.7738
Friday	0.003066	0.3978	-0.002501	0.5479
Saturday	0.004320	0.4375	0.010111**	0.0466
Sunday	0.003448	0.4389	0.005305	0.2923
Variance Equation				
C	7.76E-05	0.0000	0.000111	0.0000
RESID(-1)^2	0.056408	0.0000	0.087793	0.0000
GARCH(-1)	0.898873	0.0000	0.877082	0.0000
Dependent Variable: Returns during the Russia-Ukraine Conflict				
Variables	Coefficient	Prob.	Coefficient	Prob.
Monday	0.001661	0.3912	-0.001846	0.5070
Tuesday	0.004568**	0.0404	0.004609	0.1113
Wednesday	0.004148*	0.0644	0.001643	0.5030
Thursday	-0.002824	0.2442	-4.77E-05	

	Coefficient	Prob.	Coefficient	Prob.
Friday	-0.001176	0.5973	0.001558	0.9832
Saturday	-0.000428	0.9499	-0.001284	0.6045
Sunday	0.002722	0.3801	0.001454	0.7833
				0.6915

Variance Equation				
C	8.50E-05	0.0000	4.51E-05	0.0000
RESID(-1)^2	0.141452	0.0000	0.101188	0.0000
GARCH(-1)	0.756819	0.0000	0.862634	0.0000

Dependent Variable: Returns during the Palestine-Israel War

Variables	Coefficient	Prob.	Coefficient	Prob.
Monday	0.023413***	0.0000	0.002836***	0.0000
Tuesday	0.004516	0.3846	-0.006145	0.3806
Wednesday	0.012258**	0.0120	0.005071	0.4792
Thursday	-0.005645	0.3248	0.004143	0.5709
Friday	0.008678	0.1447	0.002310	0.7652
Saturday	0.000366	0.9828	-0.000301	0.9805
Sunday	-0.001665	0.8525	-0.001721	0.8687

Variance Equation				
C	0.000267	0.1272	1.91E-05	0.4147
RESID(-1)^2	-0.090863	0.0000	-0.118250	0.0019
GARCH(-1)	0.614370	0.0366	1.095676	0.0000

Notes: The symbol * denotes significance for Probability Values (prob.) at the 1 per cent (***), 5 per cent (**), and 10 per cent (*) levels. respectively.)
Source: Authors

5. Discussion

This research attempt to explore the day-of-the-week (DOW) effect in Bitcoin and Ethereum returns, across three key global crises viz., the COVID-19 pandemic, the Russia-Ukraine war, and the Palestine-Israel conflict. The results provide that there is noticeable variations in the returns during weekday. It demonstrate that the shocks at global level significantly shape and alter the dynamics of the cryptocurrency market. This is evident from the existing studies too as Aharon and Qadan (2019) reported the applicability of higher returns on Mondays and Tuesdays and these findings are consistent with the findings of the present study for the COVID-19 tenure. However, few other studies noted that cryptocurrencies such as Litecoin, Ripple, and Dash did not demonstrate the similar effects, implying that these patterns may differ according to asset type and market. As the traditional financial markets have

shown opposite trends suggested and documented by the Berument and Kiymaz (2001), negative Monday returns contrasting with the positive early-week performance of Bitcoin and Ethereum found. The presence as well as persistence of DOW anomalies across crises questions the Efficient Market Hypothesis (EMH), which asserts that the prices fully capure and incorporate the available information. Supporting Guidi et al. (2011), who detected calendar anomalies and irregularities in the emerging markets, the present study finds that the market efficiency weakens during the global uncertainties. Further, the stronger DOW effect during COVID-19 observed as compared to the Russia–Ukraine conflict suggests that health as well as geopolitical shocks influence the investors' sentiment inversely, echoing Latif et al. (2011), observed that crises could intensify market anomalies in the digital assets.

6. Conclusion

The present study carries the in-depth examination of the day-of-the-week (DOW) effect in cryptocurrency markets, majorly focusing on the Bitcoin and Ethereum returns across three major global crises (COVID-19 pandemic, the Russia-Ukraine war, and the Palestine-Israel conflict). The findings of the study endorse the presence as well as persistent DOW effect throughout these turbulent periods. It indicate notably higher returns on the specific weekdays, particularly in the early and mid-week. Such frequent patterns entail that global uncertainties induced by external shocks strongly influence the investors' sentiment and their trading behaviour. Further, the comparative analysis between the Bitcoin and Ethereum exposes the asset-specific reactions, as the Bitcoin demonstrate a more consistent as well as pronounced DOW effect amidst crises. In all the present study enhances the understanding of calendar-based anomalies and irregularities in the cryptocurrency markets, underscoring the heightened volatility, speculative bents, as well as market sensitivity of the digital assets in response to global disruptions.

The results of the present study have enormous imperative implications for the investors, market analysts, and policymakers in the cryptocurrency domain. The regular DOW effect across the COVID-19, Russia-Ukraine, and Palestine-Israel crises shows that cryptocurrency returns are highly influenced by sequential patterns, predominantly during the periods of sharp uncertainties. Investors may utilize these findings to boost the trading strategies as well as

management of risk with the anticipation of days with higher or lower expected returns in the market. The comparative evaluation of the Bitcoin and Ethereum highlight the differential response, highlights the importance of considering asset-specific behaviour while making investment decisions. As far as the regulators and policymakers are concerned, the understanding of these patterns can help to monitor the anomalies in market and in-turn enhance the transparency in the markets. It also support to design the frameworks in the market to reduce excessive volatility induced by global crises.

The present study is not free from the limitation and is also subject to potential biases arising from the sample size constraints, volatility clustering, and structural shifts in the behaviour of the market during global crises. Hence, it may limit the generalizability of the results to the broader digital asset market. Further, the research may be conducted to address these limitations with application of additional alternative econometric specifications as well as models, incorporating other types of cryptocurrencies, and extending the analysis to other crises as well as countries too.

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