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Impact of Substantial Events and Leadership Style on Stock Market Anomalies: Evidence from the Pakistan Stock Exchange

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ABSTRACT

This is an event based study focused on the stock market anomalies due to substantial events such as monsoon season, the holy month of Ramadan, and leadership style. Data for this research was collected from the Pakistan Stock Exchange from KSE All Shares, KSE-100, KSE-30 KMI-30, and KMI All Shares daily observations. ARCH family models (EGARCH) were applied to encounter volatility (Market Anomaly) in each selected event. Findings revealed that there is no such substantial impact of the holy month of Ramadan and monsoon on the stock market returns (No impact on any indices), however it is interesting to reveal that the market witnessed sizeable improvement & considerable stability in the Dictatorship regime in Pakistan, this is because of controlled market situation, stable macroeconomic environment and favorable investment opportunities due to trust on the government. Going forward, findings unveiled the importance of monitoring the market closely for all of the above-mentioned events and investors may get benefits from findings by making sound investment decisions. The core limitation of the research is that we could not cover more data and more countries which is a future direction for researchers and stakeholders.

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INTRODUCTION

Over the last three decades, the effect of calendar anomalies on the financial markets has been a significant grey area of study. Nevertheless, the efficient market hypothesis challenges the notion of these stock market deviations. Furthermore, due to regional religious differences, various calendars are followed worldwide, such as the Gregorian calendar by Christians, the Hebrew calendar by Jews, and the Hijri calendar by Muslims (Almansour, 2019; Nasir et al., 2017). In this regard, the present study aims to explore the relationship between Ramadan, monsoon, and political activity on the Pakistan stock market returns and trading volume volatility as Pakistan is an Islamic Republic where 96.28% of the population is Muslim, and the month of Ramadan and Eid-ul-Fitr, which follows Ramadan, is celebrated globally. During Ramadan, economic activities are reduced as Muslims focus more on worship and office hours, and businesses are shifted to the night hours in Muslim countries, including Pakistan, Dubai, and Saudi Arabia, which changes individuals' lifestyles and working hours. Bialkowski et al. (2010) in their study cited Qur'an verses to explain that Ramadan brings about mental changes, leading individuals to become more attracted to religious activities.

Extreme weather events such as hurricanes, floods, or wildfires can disrupt businesses and supply chains, leading to economic consequences (Howarth & Hoffman, 1984). Lanfear et al. (2019) documented strong abnormal effects of landfall hurricanes on USA stock market returns and liquidity. Osberghaus (2019) summarized the empirical literature on the effects of natural disasters and weather variations on trade and financial flows. The results of his studies find that remittance and foreign trade and spillover effects increased after the disasters.

Political events, both domestic and international, can significantly impact economies and financial markets. Elections, changes in government policies, and geopolitical tensions can create uncertainty, leading to fluctuations in the stock market and affecting investor sentiment. Sulehri and Ali (2020) investigated the political events on the Pakistan stock exchange by using event methodology. Their study found that political events have a strong impact on the stock market. Religious events can have varying impacts depending on their nature and significance. Religious conflicts or tensions can create instability, affecting investment decisions and regional economies. M. H. Hassan and Kayser (2019) studied and gave evidence that stock markets around the world have predictable patterns e.g. calendar effect, and religious effect. They investigated the Ramadan effect on Dhaka stock exchange by applying the GRACH model. Their studies concluded that Ramadan has a significant impact on the stock market and trade volume.

Sonjaya and Wahyudi (2016) provide evidence that Muslim countries' stock market is affected during Ramadan, resulting in positive investor sentiment, social sympathy, peaceful and happy feelings, and increased inclination towards worship and avoidance of evil deeds. Given that Muslims dominate Pakistan, the Ramadan effect on the Pakistan stock market needs to be explored. Notably, Pakistan has experienced periods of dictatorship, including from 1958 to 1971 for a total of 13 years, from 1977 to 1988, and from 1999 to 2008, for a total of 33 years out of 72 years.

With Muslim majority in Pakistan, Pakistan stock market might have a Ramadan effect; therefore, this study focuses on the relationship between Ramadan, monsoon, and political activity on the Pakistan stock market returns and trading volume volatility. This study is unique because this is the first study, according to the best of our knowledge, to investigate all three events altogether. This study adds value to the existing studies and gives insight to investors who want to invest in the Pakistan Stock Exchange.

LITERATURE REVIEW

Numerous studies have been conducted on the behaviour of the stock market in response to various occasions such as religious festivals, political activities, and natural phenomena such as monsoons. Since Pakistan is an Islamic country, this literature review will primarily focus on the Ramadan effect, the monsoon effect, and the effect of political leadership styles (democracy or dictatorship) on the Pakistan stock market. To begin, religious festivals are celebrated based on their respective calendars. This study specifically investigates the Ramadan effect on the stock market, as Muslims celebrate Ramadan according to the Hijri calendar. Ramadan, the ninth month of the Hijri calendar, changes the behavior of Muslims (Beit-Hallahmi & Argyle, 1997; Wasiuzzaman & Al-Musehel, 2018).

Desai and Joshi (2018) conducted research to examine the effect of monsoon on the Indian stock market. According to the findings of these studies, post-monsoon profits outperformed pre-monsoon returns by a large margin. However, these investigations provided unsatisfactory results since they used a regression model that didn't apply to this research. According to the weather effect idea, severe weather can have an impact on business activity and investor sentiment, which can subsequently have an impact on stock market returns. The weather effect theory in finance postulates that climatic factors might affect investor sentiment and thus have an impact on stock market outcomes. Although it is not often believed, there is evidence that specific weather patterns can change market dynamics. Strong supporting data for this theory, demonstrating a considerable correlation between political developments and

stock performance in emerging nations, was found by Darsono et al. (2022). According to the financial idea of the "religious effect," religious convictions might affect investor behavior and stock market performance. There is research that suggests religion affects investment decisions, though this is not universally accepted. According to the "religious effect" theory, religious events may alter investor sentiment, trade volume, and market activity. For instance, as investors concentrate on religious observances during religious holidays, trading activity may decline, reducing market liquidity and perhaps having an impact on stock prices.

A recent study by N. C. Hassan et al. (2023) investigated the effect of religious events on stock market returns in Middle Eastern countries and found significant associations between religious observances and stock market performance. Tadepalli et al. (2022) explained the theory of calendar anomalies very well in their paper. Their study documents the study on one such anomaly, namely the turn-of-the-month effect in the context of Indian stock indices. They attempt to analyze the strength and significance of the anomaly. And their study provides new insights into the efficiency of the Indian stock market exchange. Irtiza et al. (2021) explored the presence of the turn of the month effect in the Pakistani stock market. Results showed a temporary increase in the prices of registered shares on the last operating day of the month.

Zhou et al. (2023) reviews the literature of climate change and disasters on financial sectors covering banks, insurance and stock markets. The findings of his studies showed that natural disasters and climate risks increase the instability of banks and stock market returns. Factors such as reduced working hours during Ramadan, prohibition of speculation in Islam, and interest rates may impact margin trading (Iqbal et al., 2013). Sheikh et al. (2017) studied the return and volatility in the six major South Asian capital markets during six weather conditions. The results indicated that weather significantly affected these markets. The Ramadan effect was found to have a major impact on the Saudi market's returns and volatility, whereas no effect was observed on the Iranian market.

This study investigates the effect of monsoon, political stability, and Ramadan on returns and volatility in the Pakistan stock market. Due to sensitive economic situations and political disturbances, uncertainty is even more significant in emerging nations like Pakistan. Political stability is closely linked to stock returns, and an unstable political structure can severely hamper economic progress. The government must demonstrate a strong commitment to modernizing Pakistan's financial sector.

Previous literature has primarily focused on the individual effects of monsoons, volatility, and returns. This research aims to bridge a gap in the literature by

testing the combined effects of monsoon, political stability, and Ramadan on returns and volatility in the Pakistan stock market.

METHODOLOGY

In this study, the statistical techniques employed are paramount in determining the stock market behaviour in Pakistan before and after fixed national and religious events, including the leadership style, which both Democracy and Dictatorship characterize. Furthermore, we aim to monitor stock market behaviour across all indices, including KMI, ALL Shares, KMI 30, KSE All Share, KSE 30 Index, and KSE-100 Index, in light of the Monsoon Effect (June to September), Ramadan Effect (according to the Islamic Calendar), and leadership style (Regime of Dictatorship and Democracy in Pakistan).

Given the nature of the study, which primarily deals with natural phenomena, we adopted a positivist research approach, with data collected from the Pakistan Stock Exchange archival databases. The data, which is quantitative and secondary, lends itself well to a deductive research approach, which is most suited for statistical modelling. Data was sourced from various mainstreams, including PSX for indices data and the State Bank of Pakistan for macroeconomic data.

The statistical modelling employed in this research is based solely on numerical analysis, making Monophonic research techniques the best fit for the research choice. Our research took approximately one year to complete, involving robust statistical modelling with clear justification and useful findings that contribute significantly to the research universe from Pakistan's perspective.

Dataset

In our study, we investigated the Ramadan Turn Effect in the stock market by converting the Gregorian calendar to the Islamic calendar and mapping it to the stock market. We then constructed a model to identify any findings. Initially, we presented descriptive statistics to analyze the population structure. Subsequently, we conducted pre and post-diagnostics to further strengthen and enhance the usefulness of our research work. Lastly, we conducted a statistical modeling analysis to explore the sensitivity of the Pakistan Stock Market to sovereign indicators, such as Interest Rate, Inflation Rate, and Exchange Rate, by examining the complete linkages between the stock indices and macroeconomic indicators.

We obtained information on all indices recorded as KSE-100 file from "May 25, 1994, to June 28, 2019", KSE All Shares file from "October 17, 2005, to June 28,

2019", KMI All Shares index "May 10, 2016, to June 28, 2019", KSE-30 index "July 31, 2006, to June 27, 2019", and KMI All Share Index from "September 03, 2008, to June 28, 2019". Since most of the indices were generated in the future and comprise a significant portion of the index after their initiation, we have clearly stated the initiation date of each index in the overview section.

We utilized the Equivalent Probability Sampling Method (EPSM) to collect data from accessible and useful sources, ensuring that the sampling process was appropriate and rigorous.

Independent Dummy Variables:

(1) Monsoon month's effect, (2) Ramadan month effect (3) Leadership Style effect in Pakistan Stock Market Indices.

Dependent Variables:

Returns and Risk (Standard Deviation) of (1) KMI All shares, (2) KMI 30, (3) KSE All Share, (4) KSE-30 and (5) KSE-100 Index.

Hypothesis

Monsoon Effect

H1: There is a presence of calendar anomalies in the returns and volatility of the selected indices during the Turn year, Turn Month, and Turn Week.

H2: There is a presence of calendar anomalies in the returns and volatility of the selected indices during the monsoon months in Pakistan.

Equation # 1

$$\beta 6 \ldots 9 \neq \beta 1,\ 2, 3, 4, 5, 10, 11, 12 \tag{1}$$

(*6 to 9 are the monsoon month from June to September onwards*)

Ramadan Effect

H3: There is a presence of calendar anomalies in the returns and volatility of the selected indices during the month of Ramadan.

Equation # 2

$$\beta_r \neq \beta 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 \tag{2}$$

(*r represent the holy month of RAMADAN*)

Leadership Style Effect

H4: There is a presence of calendar anomalies in the returns and volatility of the selected indices during Democracy and Dictatorship in Pakistan.

Equation # 3

$$\beta_{dt,dc} \neq \beta 1994,\ 1995,\ 1996,\ 1997,\ 1998,\ 1999,\ 2000\ \ldots\ldots\ldots 2019 \quad (3)$$

(dt represent the regime Dictatorship however dc witnessed the government of democracy)

Statistical Tools and Plan of Analysis

In this study, nonparametric tests such as EGARCH, GARCH, ARCH, and ARCH-LM are used to observe the findings. Anomalies aspects, including rainstorm anomalies, Ramadan peculiarities, Calendar year abnormalities, and leadership style variances, are explored to understand their importance and their relationship with instability in the Pakistan Stock Market.

The presence of these inconsistencies is denoted by 1, while their absence is signified by 0.

To study the Anomalies Effect in the returns of the selected indices, returns were calculated using the following formula:

$$Rt = \log(Pt) - \log(P(t-1)) \quad (4)$$

Where Rt is the day-by-day return of the chosen indices at time t, P(t) denotes the end cost of the Index at timeframe t, and P(t-1) denotes the end cost of the Index at timespan t-1. The augmented Dickey-Fuller test, EGARCH Model, and ARCH LM Test were used to examine the information.

After the stationarity test, the EGARCH model was assessed to examine market differences in the record returns. GARCH family models are more suitable than ordinary least squares (OLS) for analyzing data with inconsistent fluctuations of the error term, such as heteroskedastic data. These models help recognize the highlights of instability in the chosen records' profits (Engle, 2001). The following EGARCH model was assessed for the study.

Equation # 5 (Monsoon Effect)

$$R_t : \beta_0 + \beta_1\, June + \beta_2\, July + \beta_2\, August + \beta_2\, September + {}_{\varepsilon r} \quad (5)$$

Equation # 6 (Ramadan Effect)

$$R_t : \beta_0 + \beta_1\, Ramadan\ Month + {}_{\varepsilon M} \quad (6)$$

Equation # 7 (Leadership Style Effect)

$$R_t : \beta_0 + \beta_1 \, Dictatorship \; Regime + \beta_2 \, Democracy \; Regime + \varepsilon r \tag{7}$$

Equation # 8 (EGARCH)

$$\log\left(\sigma_t^2\right) = w + \beta_{lo\ g} + \left(\sigma_{t-1}^2\right) + \alpha \left\lfloor \frac{Et-1}{\sigma t-1} \right\rfloor + \gamma \frac{Et-1}{\sigma t-1} \tag{8}$$

Equation (8) represents the constant of the variance equation, where *w* is the βlog plus the GARCH term (σ2t-1), measuring the group effect in the restricted volatility of the selected indices' returns. The ARCH term α ⌊(Et-1)/(σt-1)⌋ evaluates the proximity and extent of the ARCH influence on the measured conditional fluctuation. The asymmetric effect is evaluated by the γ (Et-1)/(σt-1) expression, which measures the vastness of the asymmetric effect. The estimated EGARCH model coefficients, along with their associated z statistics and p-values, are presented in Tables 3, 4 and 5.

Table 1.
Descriptive Statistics of Returns of Selected Indices (Highest Capitalized Firms)

	KSE ALL SHARE	KSE-100	KSE-30	KMI-30	KMI ALL SHARES
Mean	0.15%	0.15%	0.02%	0.07%	8.02E-05
Median	0.10%	0.10%	7.37E-05	0.02%	0.01%
Std. Dev.	4.37%	4.40%	1.31%	1.18%	0.98%
Skewness	14	14	0	0	0
Kurtosis	405	396	6	6	5
Jarque Bera (Prob.)	30797896	29437720	1602	1030	148
Probability	0.00	0.00	0.00	0.00	0.00

As illustrated in Table 1, the KSE-100 covers more than 70% of the capitalization of the entire stock market in Pakistan. Therefore, the volatility in this index would ultimately affect the rest of the indices. Furthermore, the top 30 highest capitalized firms are indexed into KSE-30 and KMI-30, with almost 70% of the companies being the same in both indexes. Thus, any minor or major volatility in the KSE-100 index would affect all four indices. It is noteworthy that the KSE All Share Index has a close association with KSE-100 and reported similar trends. Additionally, KSE-30 and KMI-30 include blue-chip companies that are relatively stable in the stock market, exhibiting low market fluctuations, as demonstrated by their medians of 0.007% and 0.02% and standard deviations of 1.31%, respectively.

Lastly, it is worth mentioning that the KMI-30 and KMI All Share indexes are subject to strict Shariah-compliant policies and regulations. As a result, the KMI

All Share reported the least volatile segments in this period, with an average positive return of 0.01% and a standard deviation of 0.98%.

Table 2.
Anomaly in Ramadan: ADF-Unit Root Test for selected Indices (AT LEVEL)

Indices	t-Statis	Prob. Value
KSE ALL SHARE	-15.27	0.00
KSE-100	-15.33	0.00
KSE-30	-46.75	0.00
KMI-30	-43.73	0.00
KMI ALL SHARES	-25.78	0.00

Table 2 shows that the ADF test indicates data stationarity, providing a basis for using ARCH family models. This test is a prerequisite for using such models. In Table 3 we examine the term behavioral finance to investigate whether investors exhibit herding behavior during the Holy Month of Ramadan, when investment and consumption activities are at their peak in Pakistan.

However, the results presented in Table 3 clearly demonstrate that no anomaly has been detected during the Holy Month of Ramadan, as evidenced by the coefficients of each index. The perception was that investors tend to disburse their stocks/securities to meet unusual expenses during Eid-ul-Fitar and other costs associated with Ramadan. However, anomalies were found only in KSE All Shares, which were small and negligible. An anomaly refers to a period (such as a day, a month, or a year) that generates abnormal profits or losses compared to the rest of the months.

Furthermore, ARCH, GARCH, and asymmetry terms are significant for KSE-100, KSE-30, KMI-30, and KMI All Shares returns. The reason to use these econometric techniques is their functions which exactly match our data requirements. GARCH widely applies to various financial time series, including stock returns; GARCH models capture conditional heteroskedasticity by modeling time-varying volatility. They allow researchers to estimate and forecast changing volatility patterns in financial data.

However, GARCH was insignificant for the KSE-100 index at a significance level of 0.05 or 5%, indicating that there are strong clustering features that affect the conditional volatility in each index. The estimated coefficient did not reveal any calendar year anomaly. Moreover, the sensitivity analysis revealed that good news or positive shocks (internal shocks) have a lesser impact on conditional variance than negative news, surprises, or bad information (economic conditions), which tend to have a greater impact on placing volatility in stocks.

Table 3.
GARCH Model (Data heteroscedasticity)

	Coeff.	z-stat.	Prob.	Coeff.	z-stat.	Prob.	Coeff.	z-stat.	Prob.
	KSE All Shares			**KSE-100**			**KSE-30**		
				Mean Equation					
C	0.00228	30.75977	0.00000	0.00	0.90	0.37	0.00	4.71	0.00
RAMADAN EFFECT	-0.00136	-10.33033	0.00000	0.00	-0.04	0.97	0.00	0.08	0.94
AR (1)	0.25	17.33	0.00000	0.25	17.35	0.00	0.37	22.36	0.00
				Variance Equation					
C	-0.3411	-74.5302	0.0000	-6.249209	-40.00917	0	-0.934282	-15.06564	0
ARCH Term	0.8032	193.5708	0.0000	0.01	4.127443	0	0.295253	14.00534	0
Asymmetry term	-0.5537	-175.2484	0.0000	0.01	4.155103	0	-0.133137	-12.02217	0
GARCH Term	1.0047	1043.8190	0.0000	0.01	0.399961	0.6892	0.921006	153.7627	0
ARCH LM Test									
		t-Statistic	**Prob.**		**t-Statistic**	**Prob.**		**t-Statistic**	**Prob.**
		-0.038428	0.9693		10.93269	0.00		-0.305056	0.7603
	KMI-30			**KMI All Shares**					
				Mean Equation					
C	0.001105	7.022898	0	0.000467	1.645643	0.0998			
RAMADAN EFFECT	0.000153	0.413392	0.6793	-0.000215	-0.263271	0.7923			
AR (1)	0.336865	18.50789	0	0.10536	3.198101	0.0014			
				Variance Equation					
C	-0.815049	-11.26707	0	-0.718409	-6.195201	0			
ARCH Term	0.23067	12.42636	0	0.160933	4.718999	0			
Asymmetry term	-0.139786	-12.26579	0	-0.144963	-6.708748	0			
GARCH Term	0.930175	133.9266	0	0.937275	83.87577	0			
ARCH LM Test									
		t-Statistic	**Prob.**		**t-Statistic**	**Prob.**			
		0.788708	0.4304		-0.117052	0.9068			

Moving forward, the key observable segment in the Table 3 is the asymmetry term, which exhibits strong clustering features of conditional volatility (ARCH Term). ARCH models are suitable for financial time series data where volatility clustering is observed; the ARCH model is the precursor to GARCH and focuses on capturing conditional heteroskedasticity by incorporating lagged squared residuals in the model. It offers a simple way to model time-varying volatility.

This results in persistent fluctuations during the Holy month of Ramadan. However, the estimated coefficient for KSE All Shares return is the only significant one, indicating negative returns recorded during the Holy month. Additionally, ARCH, GARCH, and Asymmetry terms are significant for KSE-100, KSE-30, KMI-30, and KMI All Shares returns. Furthermore, when there is bad information or economic shocks, volatility increases. This leads to an increase in business risk, and investors tend to shift their funds to less risky investments. This is known as the leverage effect.

Table 4.
(Clustering effect) EGARCH Model

	Coeff.	z-stat.	Prob.	Coeff.	z-stat.	Prob.
	KSE All Shares			**KSE-100**		
			Mean Equation			
C	0.001422	52.68285	0	0.001549	43.73247	0
Leadership Style	0.011142	1.26E+02	0	0.010502	7.40E+01	0
AR (1)	0.250349	17.45962	0	0.250516	17.47204	0
			Variance Equation			
C	-0.65304	-87.9266	0	-0.68432	-80.1161	0
ARCH Term	0.758895	201.9631	0	0.791133	151.3903	0
Asymmetry term	-0.39148	-147.592	0	-0.3978	-109.175	0
GARCH	0.981135	870.0034	0	0.980302	719.9836	0
			ARCH LM Test			
		t-Statistic	**Prob.**		**t-Statistic**	**Prob.**
		-0.06903	0.945		-0.0952	0.9242

The prerequisite for employing the EGARCH model is that there should be volatility clustering. EGARCH is particularly useful for modelling financial data that display leverage effects, such as stock returns, where negative market movements tend to result in higher volatility. To diagnose data heteroscedasticity, a residual diagnostic test was applied. The Table 3 shows that the AR (1) p-value is less than 0.05 or 5%, indicating that ARCH family models fit anomaly modelling.

Moving on to Table 4, only two indices had complete data in both regimes. The AR (1) p-value in both classes is less than 0.05, indicating that the ARCH family model can be employed since there is a clustering effect in the mean equation. The ARCH term, GARCH term, and Asymmetry term are significant at 0.05 in both segments, indicating the presence of clustering features in conditional variance in leadership regimes. This segment will be further discussed in a separate head. To diagnose this equation, a validation ARCH-LM test was employed, which is not significant at 0.05. This means that the residuals of EGARCH do not have the ARCH type heteroscedasticity, and the model is fit to explain the findings.

Pakistan experiences a highly dynamic climate environment, with the southern region being hot and lacking the effects of a strong monsoon, while the northern region is enriched with cold-weather snowfall. Over 75% of business activities in Pakistan are concentrated in Karachi City, which is located in the southern region of the country. Despite the unpredictable nature of the stock market weather in Karachi, there is no sequential raining system that can harm business activities.

To explore the volatility clustering features of conditional variance, an AR(1) heteroscedasticity test was employed for each Index, revealing significant results at 0.05 and indicating the need to utilize ARCH family models. The equations for each Index suggest that there are volatility clustering features in the conditional variance, with Table 5 providing insight into how an investor can generate supernormal profits by defeating market anomalies. The estimated coefficient of KSE All Share returns is significant at 0.05, with only negative returns reported in August, while the rest of the months saw positive returns. The table reveals mixed market anomalies, with negative sequential returns observed in August (Volatility Clustering Features).

In Table 6, the critical role of information in market anomalies is discussed. KSE-100 returns reflected negative returns in August, and positive returns in June and September, but no anomalies were detected in July. This anomaly-free month is attributed to critical information that was discovered, as discussed below. Interviews conducted with stock market specialists during the research revealed the significant effect of information on market anomalies, which aligns well with the results obtained from the data in the table. Furthermore, important dates that generate clustering effects in the stock market of Pakistan, such as Board Meetings, Financial Result Announcements, Dividend Declarations, and Dividend Encashment, were classified. The example of HASCOL is used to illustrate how the stock price of the company rises following a Board Meeting (June), continues to rise until the final accounting disclosures (July), and finally experiences a negative anomaly during dividend disbursement (August), as detected in KSE All Shares (Entire Market Volume).

Table 5.
(Monsoon Effect) EGARCH Model

	Coeff.	z-stat.	Prob.	Coeff.	z-stat.	Prob.	Coeff.	z-stat.	Prob.
	KSE All Shares			**KSE-100**					
				Mean Equation					
C	0.00141	62.04480	0.00000	0.001618	51.38566	0	0.000977	6.698324	0
June	0.01204	161.51700	0.00000	0.010826	140.7117	0	-0.00103	-1.62897	0.1033
July	0.00085	2.89613	0.00380	-0.00021	-0.98925	0.3225	0.000477	0.912145	0.3617
August	-0.00146	-5.24461	0.00000	-0.003	-9.3641	0	-0.00148	-2.77534	0.0055
September	0.01309	76.07507	0.00000	0.006836	20.38493	0	-0.0017	-2.68106	0.0073
AR (1)	0.24991	17.42701	0.00000	0.250085	17.43999	0	0.37131	22.62872	0
				Variance Equation					
C	-0.75455	-50.28937	0.00000	-0.92182	-58.8297	0	-0.86145	-14.3146	0
ARCH Term	0.88063	55.21105	0.00000	1.072322	65.39318	0	0.296378	13.88963	0
Asymmetry term	-0.44191	-57.59552	0.00000	-0.51521	-69.3735	0	-0.13052	-12.3554	0
GARCH	0.97054	947.70270	0.00000	0.963419	727.7411	0	0.929353	158.7906	0
ARCH LM Test									
		t-Stat.	**Prob.**		**t-Stat.**	**Prob.**		**t-Stat.**	**Prob.**
		-0.070073	0.9441		-0.12959	0.8969		-0.26555	0.7906
	KMI-30			**KMI All Shares**					
				Mean Equation					
C	0.001284	8.071469	0	0.00065	2.15382	0.0313			
June	-0.00088	-1.529491	0.1261	-0.0004	-0.49677	0.6194			
July	0.000767	1.363336	0.1728	0.000102	0.080242	0.936			
August	-0.00069	-1.323742	0.1856	-0.0017	-1.56951	0.1165			

Continued on next page

Table 5 continued

	Coeff.	z-stat.	Prob.	Coeff.	z-stat.	Prob.	Coeff.	z-stat.	Prob.
September	-0.00138	-2.6358	0.0084	-0.00052	-0.50501	0.6136			
AR (1)	0.338139	18.58698	0	0.0992	3.009301	0.0027			
Variance Equation									
C	-0.74787	-10.77795	0	-0.71565	-6.38634	0			
ARCH Term	0.227254	12.38422	0	0.151009	4.590492	0			
Asymmetry term	-0.13501	-12.2046	0	-0.15074	-6.96044	0			
GARCH	0.937273	140.445	0	0.936869	86.32829	0			
ARCH LM Test									
		t-Stat.	**Prob.**		**t-Stat.**	**Prob.**			
		0.843005	0.3993		-0.1112	0.9115			

Table 6.
(Mixed market anomalies) Market Share (in Millions)

Index	KSE All Share	KSE-100	KSE-30	KMI-30	KMI All Shares
# Of Companies	449	100	30	30	227
Total Volume (on Market Value)	5,654,716	4,678,689	2,308,827	1,770,594	3,091,702
%	100.00%	82.74%	40.83%	31.31%	54.67%

The study highlights the dynamic climate environment in Pakistan and the need to employ ARCH family models to investigate the volatility clustering features of conditional variance. The mixed market anomalies observed in the data suggest the possibility of generating supernormal profits by defeating these anomalies. Additionally, the critical role of information in market anomalies is discussed, with important dates that generate clustering effects identified. Overall, the study provides valuable insights into the stock market in Pakistan and the factors that influence market anomalies.

This study has employed a series of statistical tests to determine the final ARCH family model specification. Initially, descriptive statistics and data stationarity were analyzed, and on backtesting, several models such as OLS, GARCH, TARCH, and EGARCH were statistically driven. The criteria of model selection for the ARCH family model suggested the use of the EGARCH model for developing research findings Table 7.

Table 7.
Summary of Model Selection

Test	AIC	SIC	HQC
GARCH	0	0	0
TARCH	5	5	5
EGARCH*	7	7	7
Total Models	12	12	12

Undesirable news shocks more as opposed to positive news, good news, and family shocks. Consequently, the term unwelcome news or unpleasant data pertains to a nation's economic disorder. When there are negative earnings in any investment project, it gives investors ample space to rearrange their venture in a risk-free project. To test the compassion of the stock in the framework of Interest Rate (1 Month KIBOR Rate as Proxy), T-Bills Rate (3 Months T-Bills Monthly Rate), and Exchange Rate (Month), the relationship between KSE-All shares and these variables was examined Table 8.

Table 8.
News Shock and KIBOR

Variable	Coefficient	Std. Error	t-stat.	Prob.	Variable	Coefficient	Std. Error	t-Stat.	Prob.
KSE-ALL Share Index					**KSE-100 Index**				
KIBOR	-0.27	0.14	-1.97	0.05	KIBOR	-0.0000265	0.0000859	-0.308875	0.7577
D(TBILLS)	-0.67	0.33	-2.03	0.04	D(TBILLS)	-0.57733	0.348447	-1.656867	0.0991
ER	-0.80	0.29	-2.78	0.01	ER	-0.891163	0.309143	-2.882689	0.0044
C	0.04	0.01	3.50	0.00	C	0.022562	0.005074	4.446475	0
Adj. R-squared	0.082125	BPG Test p-value	F-stats	Prob. F	Adj. R-squared	0.053949	BPG Test p-value	F-stat.	Prob. F
DW-stat	1.928793	0.8293	6.471841	0.000325	DW-stat	1.79292	0.4468	3.915769	0.009516
KSE-30 Index					**KMI-30 Index**				
KIBOR	-0.000231	0.000273	-0.846685	0.3986	KIBOR	-0.000334	0.000212	-1.576834	0.1176
D(TBILLS)	-2.161463	1.509086	-1.432299	0.1543	D(TBILLS)	-0.471839	1.444749	-0.326589	0.7446
ER	-0.973744	0.391394	-2.487883	0.014	ER	-0.717985	0.319589	-2.246585	0.0266
C	0.010281	0.006479	1.586797	0.1148	C	0.016904	0.004829	3.500465	0.0007
Adj. R-squared	0.090951	BPG Test p-value	F-stat.	Prob. F	Adj. R-squared	0.095176	BPG Test p-value	F-stat.	Prob. F
DW-stat	1.940146	0.7905	4.6357	0.004028	DW-stat	2.29365	0.3217	3.962041	0.009971

KSE-All is a comprehensive representation of stock trade, comprising all remarkable tradable stocks in the securities exchange. The determined outcomes suggest that KSE-All shares report a negative relationship with the exchange rate. This negative relationship further discourages investors from investing due to the instability of the currency value. Pakistan's stock market is dominated by manufacturing firms, and as a result, import influences the market to a great extent. Therefore, exchange rates act as an essential part of stock records. Moreover, it is further recognized that the Pakistan Stock Exchange is being controlled by a few of the largest local players (Brokerage Houses) who hold around 60% of the entire market. This means that there is a consistent foreign direct investment (FDI) and substantial local funds Table 9.

Moving on to the other remaining indexes, KSE-100 index incomes have no substantial relationship with Interest Rate (Proxy KIBOR) and T-Bill Rates. However, with exchange rate-dependent variables, a significant adverse relationship has been explained in Table 10.

The remaining two indices, KSE-30 and KMI-30, hold a market share of 40.83% and 31.31% respectively, contributing significantly to the overall industry. Therefore, it is reasonable to expect that the results obtained from either of them would be quite similar. Thus, it is presumed that investors are primarily concerned with the exchange rate in every index. However, it is worth noting that while investors in the entire market are sensitive to interest rates and T-bill rates, which signify the shift from risky (equity investment) to risk-free (government or corporate securities) investments, the change in KIBOR has been incorporated in the above-mentioned equation. Furthermore, no autocorrelation has been detected in any of the equations in the estimated model.

In this section, several diagnostic tests were conducted. Table 10 illustrates the correlogram, which demonstrates that there is no serial correlation among the residuals of the estimated equation. Each column in the table represents the results of all five indices with 10 lags. The values displayed are the p-values obtained from the residual diagnostic test in EViews, with the null hypothesis stating that there is no serial correlation among the residuals of the estimated equation. However, while many econometricians do not strongly advocate for normality in ARCH family models, it should be acknowledged that this could be a limitation of the research.

Table 9.
Exchange Rate

S.no	Sector	No. of Companies	Nature of Company	Volume based on Market Value	Market Share
1	COMMERCIAL BANKS	20	Non-Manufacturing	1027381.321	18.17%
2	OIL & GAS EXPLORATION COMPANIES	4	Manufacturing	726633.6507	12.85%
3	FOOD & PERSONAL CARE PRODUCTS	20	Manufacturing	544018.7722	9.62%
4	TOBACCO	3	Manufacturing	530989.1023	9.39%
5	FERTILIZER	6	Manufacturing	419491.0453	7.42%
6	CEMENT	19	Manufacturing	318329.9635	5.63%
7	CHEMICAL	26	Manufacturing	268163.884	4.74%
8	POWER GENERATION & DISTRIBUTION	14	Manufacturing	231104.6486	4.09%
9	PHARMACEUTICALS	12	Manufacturing	205534.3699	3.63%
10	TEXTILE COMPOSITE	36	Manufacturing	194943.99	3.45%
11	AUTOMOBILE ASSEMBLER	13	Manufacturing	194622.7008	3.44%
12	OIL & GAS MARKETING COMPANIES	8	Manufacturing	143401.154	2.54%
13	INSURANCE	25	Non-Manufacturing	129437.4408	2.29%
14	INV. BANKS / INV. COS. / SECURITIES COS.	22	Non-Manufacturing	85318.56692	1.51%
15	TECHNOLOGY & COMMUNICATION	12	Manufacturing	64221.93985	1.14%
16	MISCELLANEOUS	18	Manufacturing	62104.43191	1.10%
17	SUGAR & ALLIED INDUSTRIES	27	Manufacturing	59326.0823	1.05%
18	ENGINEERING	17	Manufacturing	58448.95326	1.03%
19	TRANSPORT	5	Non-Manufacturing	58369.57664	1.03%
20	REFINERY	4	Manufacturing	45606.93915	0.81%

Continued on next page

Table 9 continued

S.no	Sector	No. of Companies	Nature of Company	Volume based on Market Value	Market Share
21	PAPER & BOARD	8	Manufacturing	41137.03466	0.73%
22	SYNTHETIC & RAYON	6	Manufacturing	39632.3379	0.70%
23	AUTOMOBILE PARTS & ACCESSORIES	7	Manufacturing	39566.0122	0.70%
24	TEXTILE SPINNING	50	Manufacturing	38684.50292	0.68%
25	GLASS & CERAMICS	8	Manufacturing	33619.12558	0.59%
26	LEATHER & TANNERIES	4	Manufacturing	23307.21835	0.41%
27	REAL ESTATE INVESTMENT TRUST	1	Manufacturing	22815.162	0.40%
28	CABLE & ELECTRICAL GOODS	7	Manufacturing	20670.50312	0.37%
29	MODARABAS	28	Non-Manufacturing	11369.94157	0.20%
30	VANASPATI & ALLIED INDUSTRIES	3	Manufacturing	6280.210979	0.11%
31	LEASING COMPANIES	5	Non-Manufacturing	4015.45965	0.07%
32	CLOSE - END MUTUAL FUND	3	Non-Manufacturing	3293.15375	0.06%
33	TEXTILE WEAVING	7	Manufacturing	2508.482181	0.04%
34	WOOLLEN	1	Manufacturing	368.3671875	0.01%
	Total	449		5654716.045	100.00%
	Summary				
	Non-Manufacturing	23.33%			
	Manufacturing	76.67%			

Table 10.
Correlogram Squared Residuals

Lagged	Autocorrelation	Partial Correlation	KSE ALL	KSE-100	KSE-30	KMI-30	KMI ALL
1	No	No	0.945	0.882	0.786	0.441	0.933
2	No	No	0.994	0.989	0.956	0.733	0.882
3	No	No	0.999	0.998	0.993	0.881	0.969
4	No	No	1	1	0.989	0.933	0.859
5	No	No	1	1	0.995	0.938	0.72
6	No	No	1	1	0.997	0.973	0.787
7	No	No	1	1	0.999	0.974	0.481
8	No	No	1	1	1	0.987	0.58
9	No	No	1	1	1	0.993	0.459
10	No	No	1	1	1	0.994	0.502
		Jarque - Bera	1690	1561	1217	1221	11.63
		p-value	0.00	0.00	0.00	0.00	0.00

DISCUSSION

The main objective of this study is to examine the impact of conventional and non-conventional events on the abnormal returns of the listed stock indices in Pakistan. We observed that investors do not withdraw their investments during the holy month of Ramadan, likely due to the dominance of big players in the Pakistan Stock Exchange (PSX) market. Our results support Shehadeh and Zheng (2023) study, he used GRACH methodology in stock market returns of seven middle east countries. Their study offers additional knowledge and supporting data concerning the characteristics, presence, and enduring nature of seasonal trends in returns observed in emerging stock markets.

However, we identified a significant positive clustering effect in June due to the book closure, which was when around 75% of investors closed their books. Additionally, when dividends were distributed in August, the market returned to its previous levels, indicating a negative clustering effect in the EGARCH equation. Lastly, we aimed to investigate whether leadership style had any effect on stock market anomalies, and our findings show a strong positive clustering effect in the Pakistani stock market, indicating healthy growth during a dictatorship regime.

The Pakistan Stock Exchange is an exemplary market in the Asian region, despite facing critical challenges while maintaining its consistent performance. Discussions regarding market inconsistencies due to specific events that may generate abnormal returns in the listed stock indices of the Pakistan Stock Exchange are always at the forefront of evaluation. To comprehend these

inconsistencies and understand market anomalies, we drew upon potential variables from previous studies.

Although a substantial body of research exists on calendar anomalies, the majority of studies predominantly concentrate on stock markets in developed nations (Tadepalli & Jain, 2018). Our study solely focused on events such as the Ramadan Effect, Monsoon Effect, and Leadership Style in Pakistan. During our research, we identified numerous findings related to event occurrence and market anomalies. Additionally, we anticipate potential market shocks due to the rapid global climate change, such as the recent heavy rainfall in Karachi that severely damaged the industrial hub and caused a slowdown in business activities, resulting in financial losses in the stock market.

LIMITATIONS AND IMPLICATIONS

We strongly advise individual investors to pay close attention to market events, as suggested by our research. Specifically, our findings suggest that June is the least effective month while August is the most effective. Financial institutions, which are considered the brains of the economy, should take note of these events and make strategic investment decisions to achieve lucrative returns and mitigate risks associated with the securities they purchase.

Policymakers in Pakistan are another important audience for our research. We identified two major streams of governance, dictatorship and democracy, each with different economic policies. Our research found that one policy was effective while the other was not. We recommend that policymakers adopt a similar monetary policy for both regimes to provide investors with a greater sense of security and encourage Foreign Direct Investment (FDI), which would help to strengthen the Pakistani economy.

Each research investigation comes with its own set of constraints, and in this study, there were particular limitations. The primary restriction of this research was our inability to encompass a broader range of data and include additional countries, which stands as a potential avenue for future exploration by researchers and stakeholders. Another limitation related to leadership style is mostly dictatorship ruled as compared to democracy in Pakistan.

ABBREVIATIONS

Pakistan Stock Exchange (PSX), Karachi Stock Exchange (KSE), Efficient Market Hypothesis (EMH), Behavioral Finance Macro (BFMAC), Autoregressive Conditional Heteroscedasticity (ARCH), Generalized Autoregressive Conditional Heteroscedasticity (GARCH), Exponential Generalized Autoregressive Conditional

Heteroscedasticity (EGARCH), Pakistan Bureau of Statistic (PBS).

CONFLICT OF INTEREST

The authors unequivocally affirm that there are no existing financial or personal conflicts of interest that could influence the outcome of this study. Additionally, no financial assistance or remuneration has been received for the execution of this research or the composition of this article. We also confirm that we have no direct financial or personal affiliations that could potentially bias the results or interpretations presented herein.

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