Religious Holiday Anomaly : Evidence from the Indian Equity Market

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Abstract

Purpose : Investments in financial markets are intended to provide higher returns. However, this complex market is influenced by a large number of events, creating a disruptive effect on price movements and potentially leading to market distortions. In this context, the present study examined the persistence of seasonal anomalies during religious holidays in the Indian stock market.

Design/Methodology/Approach : The model employed symmetric and asymmetric GARCH models. The symmetric GARCH model captured volatility clustering, whereas the asymmetric PGARCH model included long-memory and leverage effects. Additionally, a robustness test using the ARIMAX model was conducted to assess temporal pre- and post-holiday effects. The period from July 2020 to December 2022 was selected based on the BSE Sensex and NSE Nifty 50 indices.

Findings : The results revealed that Christian and Jainist holidays showed significant pre-holiday returns, while Hindu and Sikh holidays showed stronger post-holiday return effects. No significant effects were found for Islamic holidays. Volatility clustering patterns exhibited distinct holiday-specific market characteristics. Finally, the robustness test confirmed the persistence of the time-varying pre- and post-religious holiday effects.

Practical Implications : Market participants could enhance their profit trading strategy by carefully considering the timing and position of religious holidays. Regulatory measures could enhance the limits of circuits around major religious holidays to prevent excessive volatility and market manipulation.

Originality/Value : To the best of our knowledge, no previous study has examined the market impact of mandated religious observations. This study added value to the behavioral finance literature on how religious beliefs influence stock market behavior.

Keywords : **seasonal anomalies, Indian stock market, behavior finance, GARCH model, religion**

JEL Classification Codes : C22, G10, G14, G40

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The efficient market hypothesis (EMH) posits that stock "prices fully reflect all available information," making it impossible for investors to outperform the market (Ashraf & Baig, 2019; Vashishtha & Hooda, 2014). However, increasing evidence challenges this theory, particularly through observations of market anomalies (De Bondt & Thaler, 1987; Heston & Sadka, 2008; Woo et al., 2020). Calendar anomalies, such

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as day-of-the-week, month-of-the-year, and holiday effects, which contradict the EMH, have been extensively studied (Chandra, 2011; Choudhary, 2007; Kasidi & Banafa, 2022; Kothari et al., 2017; Rossi, 2016; Shehadeh & Zheng, 2023). Subsequent studies have focused on the persistent occurrence of periodic anomalies in stock markets. Notable studies include Bentzen (2009), Chatzitzisi et al. (2021), Lobão (2019), and Mangala and Lohia (2017), among others. To account for these periodic anomalies, religious events provide crucial insights that are observed globally. Religious beliefs and practices play a pivotal role in shaping human behavior and economic decisions and demonstrate their significant influence on stock market returns and trading patterns (Atmaz & Basak, 2018; Canepa & Ibnrubbian, 2014; Hilary & Hui, 2009). The Indian market presents a unique setting for studying the effects of religious holidays due to its diverse religious composition and rich cultural tapestry.

Despite extensive research on seasonal anomalies in stock markets, there is a significant gap in our understanding of the relationship between religious events and stock market behavior in emerging economies. The influence of religious events on market dynamics is limited and fragmented. Existing studies have examined specific religious events with limited time spans (less than a decade), focusing on isolated religious holidays/festivals that fail to provide a comprehensive understanding of religious anomalies across different faiths and their long-term impacts on market behavior. Furthermore, the analysis of pre-and post-holiday effects using advanced volatility modeling techniques remains largely unexplored, particularly in the context of diverse religious events. This study addresses these limitations by investigating the impact of major religious holidays on stock market returns and volatility in the Indian market, which presents an ideal setting due to its religious diversity and emerging market characteristics.

This study contributes to the literature in three significant ways. First, it enhances our understanding of how cultural and religious beliefs influence market efficiency in emerging economies. Second, it provides the first comprehensive analysis of multiple religious holidays over an extended 30-year period, moving beyond the limited scope of previous studies that have focused on specific festivals or shorter timeframes. Finally, it employs both symmetric and asymmetric GARCH models to evaluate the pre- and post-holiday effects across diverse religious events, thereby offering new insights into the temporal dynamics of religious anomalies in the financial markets.

Literature Review and Hypotheses Development

The seminal evidence of holiday anomalies was pioneered by Fields (1934), who found that stock market valuations demonstrate notable fluctuations proximal to holiday periods. Contemporary studies suggest that the holiday effect is predominantly attributed to psychological mechanisms rather than to traditional rational economic models. Investors exhibit distinctive behavioral patterns, characterized by increased stock purchasing activity preceding holidays, which can be primarily explained by emotional states such as heightened optimism and collective psychological enthusiasm (Al-Ississ, 2015; Marrett & Worthington, 2009; Vergin & McGinnis, 1999). This implies that market participants frequently demonstrate cognitive biases and emotional responses during these periods, resulting in investment choices that deviate from the traditional models of market efficiency and rational expectations. Studies across different religious contexts, including Muslim (Al-Khazali et al., 2017), Christian (Pantzalis & Ucar, 2014), and Jewish (Frieder & Subrahmanyam, 2004) holidays, have demonstrated significant market movements around religious celebrations. These findings suggest that deviations from standard stock price movements and volatility patterns during religious observances can be attributed to the distinctive ways investors process information and make decisions. The behavioral and emotional dynamics unique to religious holidays appear to influence market participants' cognitive processes and sentiment-driven trading activities, leading to observable variations in market behavior that diverge from typical patterns (Halari et al., 2015; Hassan & Kayser, 2019; McGowan Jr. & Jakob, 2010; Robins & Smith, 2019).

Several studies have documented significant changes in returns and volatility in Islamic markets during Ramadan and Hajj (Al-Hajieh et al., 2011; Al-Khazali et al., 2017; Białkowski et al., 2012; Chaouachi, 2021; Safitri & Asandimitra, 2016; Wasiuzzaman, 2017). The investigation of Jewish holidays and cultural celebrations has yielded elevated trading volumes and returns preceding Jewish holy days and St. Patrick's Day celebrations (Frieder & Subrahmanyam, 2004). Notable market responses have occurred during Christian observances (Al-Ahmad & Al-Ali, 2016). Moreover, systematic patterns in trading behavior and excess returns around Hindu festivals, especially during Diwali, have been observed (Harshita et al., 2019; Kumar, 2012; Kumar & Dawar, 2017; Tadepalli et al., 2025). A significant positive return during the lunar cycle and a new Moon effect has been observed (Chia et al., 2015; Ghalke et al., 2023; Qadan et al., 2019). Several studies challenged the existence of market anomalies through various exchanges. For instance, the Ramadan effect found no significant relationship between stock market returns and volatility (Akbalik & Tunay, 2016; Hassan & Kayser, 2019; McGowan Jr. & Jakob, 2010), although cultural events demonstrated meaningful market influence (Chan et al., 1996). In the Indian context, comprehensive analysis employing a sophisticated approach found no substantial impact of religious holidays (Diwali effect) on stock exchange performance (Elangovan et al., 2022; Goyal et al., 2016; Khambo & Chougule, 2014; Srikanth & Ram, 2013). This finding was further corroborated by earlier studies that demonstrated that the Indian market (Devakumar & Anuradha, 2017) and BRICS nations (Goyal et al., 2016) exhibited no discernible pre- or post-festival effect. Moreover, the market has revealed mixed religious holiday effects (Kumar, 2012).

The literature demonstrates that beliefs and culture significantly influence market behavior, resulting in substantial market movements around various religious celebrations (Al-Ississ, 2015; Al-Khazali et al., 2017; Bley & Saad, 2010; Segaran & Jiun, 2021). The diverse cultural and religious landscapes of India offer an ideal setting for examining holiday-related market phenomena. Despite the proportional effect of religious and cultural practices on the Indian stock exchange at large, prior studies have focused predominantly on the Diwali effect (Kumar, 2012; Srikanth & Ram, 2013), pre-Hinduism-mandated holidays (Tadepalli et al., 2025), and Muhurat trading (Ghalke et al., 2023; Kumar & Singh, 2023). Extant literature has extensively documented holiday anomalies across pre- and post-event periods, but limited attention has been given to pre-post investigations of major religious festivals specifically related to the Indian stock market in emerging markets. A notable consideration of trivial religious holiday effects and their observance across diverse religions such as Buddhism, Jainism, and Sikhism does not exist in the Indian stock market as in other markets. At the same time, previous research has documented varying calendar effects in global markets. However, no comprehensive analysis exists for religious holiday anomalies in India, particularly during periods that are unaffected by major economic disruptions. Therefore, the following hypotheses are proposed to address these gaps and contribute to the existing literature.

- **H_{01} :** There is no significant difference in the mean returns during religious holidays compared to non-religious holidays.

- **H_{02} :** There is no significant distinct difference in the pre-and post-religious holiday effect in the Indian stock market.

- **H_{03} :** Religious holiday effects on the Indian stock market remain impersistent across different sub-periods when controlling for major economic disruptions.

Data and Econometric Model

Data Source and Sample

This study incorporated the daily closing prices of the Indian stock market indices, including the Bombay Stock Exchange (BSE Sensex) and the National Stock Exchange (NSE Nifty 50) from 1990 to 2022. Historical data for the BSE Sensex dates back to July 1985, while the NSE Nifty 50 was introduced later, with data availability beginning in July 1990. To ensure methodological consistency and enable comparative analysis between the indices, this study established July 1990 as the starting point for the investigation. The selection of these indices guarantees broader market performance with high capitalization and liquidity, thus providing a comprehensive representation of the overall market performance. The data for the Sensex and Nifty 50 indices were obtained from the official BSE[1] and NSE[2] websites, respectively. The logarithmic daily return calculates the percentage of price changes by computing the natural logarithm of the ratio between consecutive closing prices.

The study implemented strategic controls to mitigate potential confounding variables by excluding three major economic disruption periods: the Asian Financial Crisis (1997–1998), the Global Financial Crisis (2007–2008), and the COVID-19 Pandemic (2020–2021). Following methodological approaches in financial research (Cao et al., 2005), we normalized the daily closing price by averaging the last and second trading day returns to ensure continuous daily return representation and eliminate potential outliers. Key methodological considerations align with prior studies (Kamara, 1997), demonstrating the importance of controlling for external economic shocks when examining market anomalies. By implementing these controls, this study enhances the reliability of detecting genuine seasonal effects on stock return.

Religious Holidays and Data Source

Religious holidays are celebrated according to religions' distinct calendars: Jewish uses the Hebrew calendar, Christians follow the Gregorian calendar, Muslims adhere to the Hijri (lunar) calendar, and Hindus use the Vikrami calendar. The holiday selection criteria are based on observed public holidays that result in stock exchange closures. Religious holiday data were compiled from Drik Panchang[3] (an Indian festival and Hindu calendar resource) and the world time date[4]. The holidays considered in the empirical analysis do not always fall on the same Gregorian calendar. In this regard, close-to-close stock returns immediately preceding and following market trading breaks were considered. We categorized religious holiday dummies into six distinct groups: Buddhist, Christian, Hindu, Islamic, Jain, and Sikh, reflecting the diverse religious landscapes. A list of the mandated religious holidays is presented in Table 1. The religious holiday effect is a variant of the

Table 1. ***Religious Mandated Holiday and Event***

Mandated Holidays	Events (Month)
Buddha Purnima [c]	May
Christmas [b]	December
Diwali [a]	October or November
Dussehra [a]	September-October

[1] https://www.bseindia.com/Indices/IndexArchiveData.html
[2] https://www.nseindia.com/reports-indices-historical-index-data
[3] https://www.drikpanchang.com/
[4] http://www.world-timedate.com/

Eid al-Fitr [d]	Depending on the moon, Sighting
Ganesh Chaturthi [a]	September
Good Friday [b]	March or April
Guru-Nanak Jayanti [e]	November
Holi [a]	March or April
Mahashivaratri [a]	February or March
Mahavir Jayanti [f]	March or April
Mahashivaratri [a]	February or March
Muharram [d]	The first month of the Islamic calendar

Source : https://www.drikpanchang.com/

Notes. "a" indicates Hindu religious holidays, "b" represents Christian religious holidays, "c" signifies major Buddhist religious holidays, "d" denotes Islamic religious holidays, "e" represents Sikh religious holidays, and "f" indicates Jain religious holidays.

day-of-the-week effect, recognizing that religious holidays can occur on any weekday. The variability in religious holiday occurrences across different weekdays leads to potential dummy variable traps, resulting in biased variation estimation. The estimated result from the variance inflation factor (VIF) acknowledged that no dummy variable traps were found to be significant.

Religious Holiday Effect Model

To examine the effect of religious holiday anomalies on the stock market, ordinary least squares (OLS) regression encounters significant limitations; the fundamental issue lies in its constant variance assumption, which fails to capture the inherent time-varying volatility and non-normal distribution characteristics of financial time series (Connolly, 1989). ARCH models can capture the intrinsic volatility structure of financial time series more effectively than traditional static variance estimation techniques (Engle, 1982). To address these challenges, we employed the GARCH model adopted by Bollerslev et al. (1992) and the Power GARCH (PGARCH) model proposed by Ding et al. (1993). Following the specifications of Al-Khazali et al. (2017) and Białkowski et al. (2012), the GARCH (1, 1) model was formulated as follows:

$$R_{i,t} = \beta_0 + \beta_1 \, \mathrm{D}Religious\ Holiday_{it} + \varepsilon_t \qquad (1)$$

$$\sigma^2_t = \omega_0 + \alpha_i \varepsilon^2_{t-i} + \beta_i \sigma^2_{t-j} + \beta_1 \, \mathrm{D}Religious\ Holiday_{it} + \varepsilon_t \qquad (2)$$

where, $R_{i,t}$ is the return of the chosen index, β_0 is the constant or intercept term, and DReligious Holiday$_{it}$ is the dummy variable for each religious holiday, i.e., Buddhist, Christian, Hindu, Islam, Sikh, and Jain religious holidays.

Equations (1) and (2) further verify H_{02}, which is related to the pre-and post-religious holiday effects. The model can be further expressed as follows:

$$R_{i,t} = \beta_0 + \sum^6_{n=1} \beta_1 D_{Pre2} + \sum^6_{n=1} \beta_2 D_{Pre1} + \sum^6_{n=1} \beta_3 D_{Post1} + \sum^6_{n=1} \beta_4 D_{Post2} + \varepsilon_t \qquad (3)$$

$$\sigma^2_t = \beta_0 + \sum^p_{j=1} \beta_i \sigma^2_{t-j} + \sum^q_{i=1} \alpha_i \varepsilon^2_{t-i} + \sum^6_{n=1} \beta_n D_n + \varepsilon_t \qquad (4)$$

$$\varepsilon_t \sim GED(0, h_t)$$

where, $\sum^6_{n=1} \beta_n D_n$ represents a dummy for religious holiday variables. $\beta_1 + \cdots + \beta_4$ represents the corresponding

coefficients for pre- and post-religious holiday effects. ε^2_{t-1} is the innovation, α_i signifies the ARCH term which measures the impact of past innovation on the current variance. β_i is the coefficient of the GARCH effect, which measures the conditional variance over the current variance. ε_t follows the generalized error distribution (GED) to provide a more flexible alternative, as suggested by Nelson (1991).

The GARCH model is constrained by its inability to fully capture asymmetric market dynamics, leverage effects, and long memory (Chia et al., 2015; Nelson, 1991). We employed the Power ARCH or PARCH model (Taylor, 1986), a generalized model specification by Ding et al. (1993). This model represents a significant advancement in effectively incorporating the long-memory properties and leverage effect while simultaneously addressing the shortcomings of previous ARCH model extensions (Charles, 2010). The PGARCH model specification for the return Equation (3) and conditional volatility Equation (5) utilized in this study can be expressed as follows:

$$\sigma^{\delta}_t = \beta_0 + \sum_{i=1}^{q} \beta_i \sigma^{\delta}_{t-i} + \sum_{j=1}^{p} \alpha_i (|\mu_{t-i}| - \gamma_i \mu_{t-i})^{\delta} + \sum_{n=1}^{4} \beta_n D_n + \varepsilon_t \qquad (5)$$

where the parameter γ captures asymmetry in the model ($\gamma < 0, \gamma \neq 0 \sim$ asymmetric). $\delta > 0, |\gamma_i| \leq 1$ for i=1……n. The power term δ captures both standard deviation ($\delta = 1$) and conditional variance ($\delta = 2$). Following Al-Khazali et al. (2017), Charles (2010), and Farag (2013), we conducted Power ARCH modeling with $\delta = 1$ and $\delta = 2$. The model's estimation leverages EViews software's optimization techniques, specifically maximizing the log-likelihood function of the GED. Kumar and Patil (2016) demonstrated that GARCH models utilizing the GED distribution exhibit superior performance, characterized by minimal mean square error (MSE) in volatility estimation.

Analysis and Results

Descriptive Statistics and Diagnostic Test

Panel A of Table 1 presents descriptive statistics for daily returns. The Sensex return exhibits the highest volatility compared to the Nifty 50. Positive skewness characterizes the returns in Nifty 50, indicating a higher probability of extreme positive returns. Notably, both return series exhibit extreme kurtosis, indicating a high probability of extremely large or small values, signifying a large number of outliers compared with a normal distribution. The Jarque–Bera test rejected the null hypothesis of a normal distribution at the 1% significance level across all indices. Panel B of Table 1 presents descriptive statistics and a mean comparison of religious and non-religious holiday returns, revealing distinctive patterns across various faith-based celebrations in both the BSE and NSE indices. In the BSE stock index, positive mean returns were observed during Buddhist, Hindu, and Sikh holidays, whereas Christian, Jainism, and Islamic holidays exhibited negative returns. Statistical analysis indicates that religious holiday returns differ significantly from other holidays at the 10% significance level in the BSE index, and lower returns were found during the Jain and Islamic holidays. The results suggest that religious holidays may have a subtle influence on market sentiment and trading volume, potentially affecting short-term price movements and liquidity ; thus impacting overall mean returns. Thus, the results confirm the rejection of H_{01}. Panel C of Table 1 confirms the stationarity of the data using the Augmented Dickey-Fuller (ADF) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests. The presence of ARCH effects, verified through ARCH-LM and Breusch–Godfrey Correlation LM tests, reveals the inadequacy of the OLS model and validates the appropriateness of GARCH and PARCH estimations.

Results of Return and Volatility Effect

The persistence of ARCH effects and standardized residual tests for autocorrelation, as shown in the ARCH-LM

Table 2. ***Descriptive Statistics and Diagnostic Test***

	Sensex						Nifty 50					
Panel A : Descriptive Statistics of Daily Returns												
Parameter	**Mean**	**Std. Dev.**	**Skewness**	**Kurtosis**	**Jarque –Bera**	**Obs.**	**Mean**	**Std. Dev.**	**Skewness**	**Kurtosis**	**Jarque –Bera**	**Obs.**
	0.0611	1.592	–1.395	39.281	17379.4	6342	0.065	0.015	0.041	11.950	20770.1	6222
Panel B : Descriptive Statistic of Religious Holidays and Non-Religious Holidays												
	Mean	**Std. Dev.**	***t*-test**	***F*-stat**	**Jarque –Bera**	**Obs.**	**Mean**	**Std. Dev.**	***t*-test**	***F*-stat**	**Jarque –Bera**	**Obs.**
Buddhist Holiday	0.369	1.911	–1.398**	1.82	312.1	104	0.110	1.869	–0.249	0.06	783.5	6122
Non-Buddhist Holiday	0.064	1.531			16811.4	6208	0.070	2.012			20139.6	100
Christian Holiday	–0.060	–0.060	1.199	1.44	2344.5	202	0.072	1.584	–0.011	0.81	30.7	208
Non-Christian Holiday	0.072	0.072			14606.2	6110	0.071	1.448			20946.6	
Hindu Holiday	0.071	1.559	–0.047	0.09	760.2	487	0.021	1.723	0.013	1.01	2691.8	402
Non-Hindu Holiday	0.067	1.536			16765.6	5825	0.071	1.569			10427.9	6014
Jainism Holiday	–0.180	2.264	1.601***	1.11**	693.4	97	0.303	1.679	–1.417***	1.18	24.2	99
Non-Jainism Holiday	0.071	1.524			14598.8	6215	0.050	1.578			2719.1	6123
Islamic Holiday	–0.111	1.700	1.620***	1.63**	115.9	6123	–0.103	1.628	1.594***	1.54**	47.6	204
Non-Islamic Holiday	0.073	1.532			17637.3	189	0.077	1.577			3192.3	6018
Sikhism Holidays	0.139	1.474	–0.474	0.22	2.3	6211	0.143	1.475	–0.455	0.21	12.9	98
Non-Sikhism Holidays	0.066	1.539			17521.3	101	0.069	1.581			1336.2	6124
Panel C : Diagnostic Test												
Parameter	ADF	KPSS	ARCH	LM Test:	Q^2 (20)	*Q* (20)	ADF	KPSS	ARCH	LM Test:	Q^2 (20)	Q (20)
	–14.77*	0.144	477.90*	50.52*	3699.9	94.89*	–14.92*	0.121	493.12*	89.375*	3001.7	148.7*

Notes. The table reports a summary of descriptive statistics and the daily returns addressed in the study. The period considered is the entire sample. Panel C presents a comprehensive diagnostic assessment utilizing several statistical tests. The analysis incorporated ADF and KPSS tests to evaluate stationarity. To assess residual heteroscedasticity, the ARCH-LM test was conducted, and the Breusch–Godfrey LM test evaluated serial correlation. Additionally, the analysis included Ljung-Box *Q*-Square statistics up to lag 20 to test for autocorrelation patterns. *, **, *** denotes significant at 1%, 5%, and 10 % levels, respectively.

test and Ljung-Box statistics in Table 2, demonstrates the inadequacy of the OLS model in capturing the volatility dynamics in returns. To conduct a more comprehensive analysis of the effects of religious holidays on stock market behavior, our methodology employs advanced volatility modeling techniques. Specifically, both

symmetric GARCH (1,1) and asymmetric PARCH (1,1) models were used to examine the influence of seasonal religious practices on the selected stock market indices. These models were selected based on their established efficacy in capturing stock return patterns and volatility dynamics, particularly in the context of holiday effects (Al-Khazali et al., 2017; Charles, 2010; Farag, 2013; Namugaya et al., 2014).

Tables 3 and 4 present our empirical findings regarding the pre- and post-religious holiday effects, based on our analysis using the GARCH-M (1,1) and PGARCH (1,1) models. The estimation of the return equation for the BSE market in Table 3 is structured into two distinct sections: Panel A contains the results of the return equation, and

Table 3. ***Religious Holiday Effect on the Return and Volatility in the Bombay Stock Exchange***

Religious Holiday	GARCH (1,1)				PARCH (1,1)			
	$DPre_2$	$DPre_1$	$DPost_1$	$DPost_2$	$DPre_2$	$DPre_1$	$DPost_1$	$Dpost_2$
Panel A : Mean Equation								
C	0.071*	0.069*	0.079*	0.060*	0.081*	0.054*	0.061*	0.067*
Buddhist Holiday	0.247	0.273	0.285**	0.097	–0.213	0.212	0.307**	–0.115
Christian Holiday	–0.099	–0.610**	0.040	0.104	–0.036	–0.624**	0.151	0.120
Hindu Holiday	0.085	0.214**	–0.434**	0.054	0.126**	0.149***	–0.076	0.090
Jainism Holiday	–0.117	0.021	–0.208**	–0.073	0.044	–0.101	–0.238	–0.168
Islamic Holiday	–0.051	0.047	–0.434	–0.158	0.012	–0.023	0.093	–0.111
Sikhism Holidays	0.026	0.190	–0.124**	0.131	–0.017	0.153	0.228	0.129
Panel B : Variance Equation								
C	0.033*	0.022*	0.081*	0.081*	1.603*	0.021*	0.022*	0.023*
α_i	0.101*	0.102*	0.134*	0.097*	0.159*	0.109*	0.108*	0.106*
β_i	0.890*	0.895*	0.844*	0.894*	0.234*	0.158*	0.164*	0.157*
γ					0.545*	0.902*	0.898*	0.896*
δ					1.374*	1.292*	1.669*	1.693*
Buddhist Holiday	–0.072	–0.226**	0.162	0.039	–1.985**	–0.163	0.170	0.056
Christian Holiday	1.797*	0.506	–0.011	–0.111	1.497**	0.995	0.056	–0.020
Hindu Holiday	–0.064	–0.117*	–0.190**	–0.179*	–1.360**	–0.114*	–0.094	–0.032
Jainism Holiday	–0.141	–0.263**	–0.041	–0.251*	–0.495	–0.294	–0.227**	–0.058
Islamic Holiday	–0.122***	–0.163**	0.101	0.050**	–1.075**	–0.139***	0.107	0.046**
Sikhism Holidays	0.032	0.035	–0.077	–0.377*	0.457	0.006	–0.096	–0.031
GED Parameter	1.743*	1.311*	1.466*	1.628*	1.460*	1.239*	1.468*	1.465*
Diagnostic Test for Specified Model (p-value)								
ARCH-LM (10)	0.991	0.854	0.686	0.601	0.979	0.998	0.679	0.569
Q^2 (10)	0.986	0.881	0.668	0.604	0.915	0.886	0.685	0.579
Wald Test	0.000	0.00	0.01	0.00	0.00	0.00	0.00	0.00

Source : Author computation using EViews.

Notes. This table represents the estimated result of GARCH (1,1) and PARCH (1,1) models. The parameter γ signifies the asymmetry parameter in the model ($\gamma < 0$, $\gamma \neq 0$ ~ asymmetric). The power term δ represents standard deviation ($\delta = 1$) and conditional variance ($\delta = 2$). The estimation process employed EViews legacy optimization technique following a GED. The ARCH LM test examined the null hypothesis of no autocorrelation up to 10 lags. The Ljung-Box *Q*-square statistics examined the null hypothesis of no autocorrelation up to order 10. The null hypothesis of Wald test is H0 : $\beta 1 = \beta 2 \ldots\ldots = \beta 12 = 0$. *, **, *** denotes significant at 1%, 5%, and 10 % levels, respectively.

Panel B delineates the variance equation estimation. The results from Panel A of Table 3 demonstrate significant variations in market behavior during Hindu and Christian holidays. We found positive and statistically significant coefficients for the pre-holiday periods ($DPRE_2$ and $DPRE_1$) in both the GARCH and PGARCH-M models. This indicates that market returns are distinctly higher one and two days before the Hindu holidays than on regular trading days. This finding is consistent with Al-Hajieh et al. (2011).

In contrast, Christian holidays exhibit a different pattern, with significantly negative mean returns one day before the holiday. This divergence in pre-holiday effects between Hindu and Christian celebrations suggests that religious and cultural factors influence trading behavior in distinct ways. This observation rejects H_{01} and supports the findings of Białkowski et al. (2012), who documented that different religious celebrations have significant impacts on market dynamics. Furthermore, the estimated coefficient of the post-religious holiday ($DPost_1$) in the GARCH model is negative and statistically significant one day after Christian, Jainism, and Sikh religious holidays at one-day post-religious holidays. Returns are significantly lower on days following these religious holidays than on typical trading days. This finding aligns with Chong et al. (2005), who documented similar pre-holiday price reversals in international market contexts. Buddhist holidays demonstrate a markedly different pattern, with significantly positive mean returns on the day following the holiday. This implies that the null hypothesis H_{02} is rejected. The findings support Yuan and Gupta's (2014) finding that cultural and religious factors significantly influence trading patterns, resulting in excess market returns.

Panel B of Table 3 presents the results of the conditional variance equations for the two GARCH models on the BSE. Christian holidays exhibit the highest pre-holiday volatility (GARCH = 1.797, PARCH = 1.497), while Muslim holidays show the lowest pre-holiday volatility (GARCH = –0.122, PARCH = –1.075). In the post-holiday period, we observe contrasting patterns: Hindu festivals are characterized by decreased volatility (GARCH = –0.179, PARCH = –0.094), and Muslim holidays show a slight increase in volatility (GARCH = 0.050, PARCH = 0.046). These results indicate that H_{02} is rejected, suggesting that religious observances significantly influence investor behavior and market dynamics. These findings align with those of Al-Khazali et al. (2017) and Canepa and Ibnrubbian (2014). The observed volatility patterns can be attributed to shifts in investor priorities during religious festivals, as market participants typically prioritize religious practices over trading activities. The GARCH model demonstrates stronger volatility persistence than the PARCH model. This substantial difference in persistence measures suggests that market shocks have lasting effects in a symmetric GARCH framework. Both symmetric and asymmetric estimations show significant volatility clustering (α), indicating that market shocks substantially influence volatility patterns. The leverage effect (γ) is statistically significant at the 1% level, confirming that the Bombay stock market responds asymmetrically to positive and negative news events, particularly during holidays. The Power ARCH parameter (δ) demonstrates strong statistical significance at the 1% level, validating our model specification and confirming its appropriate fit with the market index's distributional characteristics. The GED parameter consistently remained below 2 across all analysis windows, indicating that stock returns follow a leptokurtic distribution with fat tails rather than a normal distribution. The diagnostic test results in Panel C of Table 3 show no remaining ARCH effect, and the Wald test shows that pre-religious and post-religious holiday effects are significant in the Bombay stock market after controlling for time-varying variance.

The estimation of the return equation for the NSE market in Panel A of Table 4 reveals distinct return patterns during religious holidays. The GARCH model estimation indicates a statistically significant positive mean return during Christian holidays in the pre-holiday period ($DPre_1$). Conversely, Jain religious holidays exhibit significantly negative mean returns during the same period. Furthermore, examining the post-holiday effects ($DPost_1$), both models demonstrate statistically significant positive returns following Hindu holidays, specifically on the first trading day after an event. Christian and Sikh holiday effects were also observed two days after the events. Thus, the null hypothesis H_{02} is rejected in the NSE market, validating the significant persistence of

Table 4. ***Religious Holiday Effect on the Return and Volatility in the National Stock Exchange***

Religious Holiday	GARCH (1,1)				PARCH (1,1)			
	$DPre_2$	$DPre_1$	$DPost_1$	$DPost_2$	$DPre_2$	$DPre_1$	$DPost_1$	$DPost_2$
Panel A : Mean Equation								
C	0.079*	0.101*	0.078*	0.083*	0.066*	0.067*	0.065*	0.070
Buddhist Holiday	0.024	–0.054	–0.229	0.015	0.076	0.104	–0.231	–0.054
Christian Holiday	–0.118	2.958*	0.171	0.224**	–0.050	0.013	0.173	0.204**
Hindu Holiday	0.015	–0.003	0.186**	–0.001	0.041	0.135	0.164**	–0.031
Jainism Holiday	0.095	–0.586**	0.025	–0.112	–0.023	–0.152**	0.004	–0.071
Islamic Holiday	0.043	–0.227	0.080	0.063	0.021	–0.089	0.050	0.033
Sikhism Holidays	0.031	0.156	0.071	0.243**	–0.022	0.104	0.051	0.196**
Panel B : Variance Equation								
C	0.033*	0.171*	0.020*	0.032*	0.029*	0.029*	0.022*	0.034*
α_i	0.098*	0.152*	0.095*	0.101*	0.108*	0.110*	0.107*	0.123*
β_i	0.890*	0.794*	0.899*	0.887*	0.251*	0.250*	0.205*	0.281*
γ					0.897*	0.895*	0.897*	0.744*
δ					1.296*	1.270*	1.564*	1.218*
Buddhist Holiday	0.079	0.003	–0.064	–0.020	0.013	0.077	–0.052	0.140
Christian Holiday	0.580*	0.121	0.054	0.492*	0.312*	0.579*	0.730	–0.032
Hindu Holiday	–0.053	–0.578*	0.591*	0.458*	–0.050	–0.081	0.025	0.403*
Jainism Holiday	–0.176**	–0.940*	–0.056	–0.116	–0.152**	–0.217	–0.186**	–0.014
Islamic Holiday	–0.088	0.247	–0.083	–0.095**	–0.062	–0.087	–0.081	–0.152
Sikhism Holidays	0.077	0.275	–0.115	–0.062	0.048	0.064	–0.048	–0.098
GED Parameter	1.45*	1.54*	1.46*	1.67*	1.23*	1.23*	1.46*	1.26*
Diagnostic Test for Specified Model (p-value)								
ARCH-LM (10)	0.95	0.94	0.85	0.76	0.78	0.97	0.85	0.73
Q^2 (10)	0.98	0.81	0.98	0.81	0.65	0.68	0.78	0.67
Wald Test	0.000	0.00	0.01	0.00	0.00	0.00	0.00	0.00

Note. See Notes in Table 3.

religious holiday effects, particularly during major religious practices. This finding aligns with the assertions of Białkowski et al. (2012) and McGowan Jr. and Jakob (2010), who asserted that religious holiday effects exhibit temporal and cultural specificity rather than universal patterns. The sporadic nature of these effects across all religious-mandated holidays echoes Shahid and Sattar's (2017) finding that holiday effects may be moderated by factors such as market liquidity, trading volume, and the religious composition of market participants. The estimated conditional variance equation in Panel B of Table 4 shows that Christian holidays exhibit the highest pre-holiday volatility (GARCH = 0.580, PARCH = 0.312), and Hindu holidays show the lowest pre-holiday volatility (GARCH = –0.940, PARCH = –0.152). In the post-holiday period, we observe contrasting patterns: Hindu festivals are characterized by an increase in volatility (GARCH = 0.591, PARCH = 0.403), while Muslim and Jainist holidays show a slight decrease in volatility (GARCH = 0.050, PARCH = 0.046). These findings align with existing literature on the relationship between religious beliefs and financial market dynamics (Atmaz & Basak, 2018; Hilary & Hui, 2009). Additionally, our results further substantiate the findings of Tadepalli et al. (2025) for emerging markets.

Robust Check Using ARIMAX Model

Long-memory analyses of religious holiday effects on stock indices can reveal various market irregularities, such as structural breaks due to domestic and global financial shocks. These control mechanisms help mitigate the estimation bias in return and volatility coefficients, particularly for stochastic return components (Bouri, 2015; Chau et al., 2014). To validate the robustness of our baseline findings and H_{03}, we implemented an ARIMAX methodology[5] that incorporates varying specifications of autoregressive, moving average, and exogenous components, ensuring the reliability of our initial data selection approach. The incorporation of ARIMAX into the

Table 5. ***Regression Output on the Changing Effect Across Religious Holidays***

	Buddhist Holiday	Christian Holiday	Hindu Holiday	Jainism Holiday	Islamic Holiday	Sikhism Holidays
Sensex						
Panel A : Before the AFC (1990–1996)						
Pre-Holiday [3,0,2]	–0.538	0.103	0.664**	0.530	0.056	–0.575
Post-Holiday [3,0,4]	–0.763	0.282	–0.173	–0.726	0.284	0.215
Panel B : Between AFC and GFC (1999–2006)						
Pre-Holiday [2,0,3]	–0.048	0.733**	0.016	0.874**	0.130	0.018
Post-Holiday [2,0,3]	0.233	–0.392	0.051	0.441	–0.193	–0.700
Panel C : Between GFC and 2015 Crash (2009–2014)						
Pre-Holiday [4,0,4]	–0.244	–0.151	–0.311***	–0.346	0.233	0.527
Post-Holiday [2,0,2]	0.100	–0.374	–0.550**	0.095	0.177	–0.185
Panel D : Between the 2015 Crisis and the COVID-19 Pandemic (2016–2020)						
Pre-Holiday [3,0,4]	–0.292	0.248	–0.158	–0.346	0.073	0.430**
Post-Holiday [4,0,4]	–0.464**	0.085	0.007	0.090	0.305	0.210
Nifty 50						
Panel A : Before the AFC (1990–1996)						
Pre-Holiday [3,0,4]	–1.103*	0.021	–0.390	–0.200	–0.054	–0.824
Post-Holiday [3,0,4]	–0.342	–0.270	–0.382**	–0.691	–0.017	0.300
Panel B : Between AFC and GFC (1999–2006)						
Pre-Holiday [3,0,2]	–0.326	0.493***	–0.072	0.502	0.517**	–0.223
Post-Holiday [3,0,3]	0.578	–0.224	0.189	0.494	–0.176	–0.628
Panel C : Between GFC and 2015 Crash (2009–2014)						
Pre-Holiday [4,0,4]	0.044	–0.319	–0.003	–0.574***	–0.358	0.232
Post-Holiday [3,0,4]	–0.247	–0.376	–0.442**	0.037	0.308	–0.366
Panel D : Between the 2015 Crisis and the COVID-19 Pandemic (2016–2020)						
Pre-Holiday [3,0,4]	0.095	–0.055	0.059	–0.505**	–0.216	0.341***
Post-Holiday [2,0,3]	–0.070	–0.239	–0.188**	–0.013	0.218	–0.140

Notes. This table presents estimated coefficient results for the returns of market indices. The subperiod stated month started from the first trading day of January and ended on the last trading day of December. The selected ARIMAX model, with specific model orders (*p,d,q*), is depicted in parenthesis.*, **, *** represent statistical significance at 1%, 5%, and 10% levels, respectively.

[5]The estimation equation aligned with (Tadepalli et al., 2025) approached.

conditional mean equation addresses potential linearity, aligned with established methodological frameworks (Kyrtsou & Labys, 2007; Tadepalli et al., 2025). The reliability of the model is found to be significant using ADF and KPSS tests, as shown in Table 1. To examine the persistence of the religious holiday effect over time, we divide the normal market event into four categories[6]. The data are divided into four critical periods, as listed in Table 5.

The analysis of Panel A in Table 4 reveals statistically significant temporal religious holiday effects on the BSE market. Prior to the 1997 Asian Financial Crisis (AFC), Hindu religious holidays show significant positive pre-holiday effects. In the period between the AFC and the Global Financial Crisis (GFC), we observed pre-holiday effects for both Christian and Jain religious holidays. This pattern has significantly shifted in recent years. During the interval between the 2015 market crash and the 2020 global pandemic, Hindu holidays exhibited negative effects. Post-holiday effects were particularly pronounced for Hindu and Buddhist holidays during two distinct periods: From the GFC to the 2015 crash and from the 2015 crash to the 2020 global pandemic. These varied findings across religious holidays and periods indicate persistent holiday effects in the indices. Furthermore, systematic effects appear consistently across multiple holiday observations, indicating H_{03} got rejected, suggesting a significant relationship between religious calendar events and market behavior.

Panel B of Table 4 demonstrates the varying effects of religious holidays on NSE under normal market conditions across different periods. Prior to the 1997 AFC, Buddhist holidays showed significantly negative pre-holiday effects. Both Hindu and Muslim holidays exhibited positive pre-holiday returns between the AFC and GFC. Negative pre-holiday effects were observed for Jain holidays during the period 2009–2014 and 2016–2020. Notably, Hindu holidays consistently showed significant post-holiday effects across all periods except during the AFC–GFC interval. This indicates that H_{03} was rejected. These findings align with those of Chia et al. (2015) and Tadepalli et al. (2025) but contradict the conclusions of Devakumar and Anuradha (2017) on religious holiday effects. The robustness test reveals persistent and statistically significant religious observances and market anomalies over time.

Conclusion

This study extends the literature on pre- and post-holiday effects by emphasizing the return patterns and volatility during religious holidays in the Indian stock market from 1990 to 2022. The results show significant persistence of the holiday effect with a reversal pattern during Hindu and Christian holidays than those of others. The results indicate that a significant pre-holiday effect with higher returns is observed during the Christian and Jainist holidays. A post-holiday effect with a higher return is observed during Hindu and Sikh holidays. Notably, the Islamic religious holiday effect is found to be insignificant in both markets. The model for checking volatility shows Christian holidays consistently show the highest pre-holiday volatility across both markets, while Hindu festivals show interesting contrasting patterns between increased volatility in the NSE market and decreased volatility in the BSE market. Overall, the Sikh holiday effect shows no significant volatility effect compared with the other religions examined.

Furthermore, the robustness of the findings shows distinct patterns across religious holidays, and Hindu festivals, in particular, demonstrate a notable temporal evolution, transitioning from positive pre-holiday returns in earlier periods to negative effects in later periods. Other religious holidays exhibit consequential varying effects on the market around religious observance. These results provide evidence of seasonal anomalies in the Indian market.

[6]There are four critical periods defined by major financial events under the period of study: Asian Financial Crisis (AFC), Global Financial Crises (GFC), a 2015 stock Crash due to ripple effect (2015 Crash), and the global pandemic (COVID-19).

Practical Implications

These empirical findings have noteworthy implications for market participants and regulatory bodies. The cognizance of market anomalies on religious holidays provides significant arbitrage opportunities for investors to adopt profitable trading strategies. The reversal patterns during the Christmas and Diwali holidays show compelling prospects for formulating precise timing of trade with proper risk management protocols to generate abnormal profits. Finally, policymakers or regulators may consider reassessment of market supervision frameworks on adaptive regulatory mechanisms in addressing temporal market anomalies that are not limited to religious holidays. Recalibration of existing circuit breaker mechanisms or limit bands, dynamic position limits, and monitoring systems is required. Mandating transparent disclosure requirements regarding holiday-related market effects would foster more informed decision-making among market participants and strengthen market integrity.

Limitations of the Study and Scope for Further Research

This study provides valuable insights into the effects of the religious calendar. The focus of the study is limited to the two-day pre-post effect, which might not account for longer periods of holidays typically observed for longer periods, such as Islamic holidays. A similar study can be conducted in other emerging or frontier markets to investigate anomalies with longer window sizes. There might be a possibility that regional events conform to other market phenomena; further research can identify alternative indicators or factors that influence market behaviors during these events. The roles of religious and others' beliefs in the local and global financial markets are not limited to the equity market (currencies, commodities, and futures markets), which is another area of further research. As previously discussed, religious holidays have demonstrated inconsequential and varying effects on the market around these observances. Therefore, it would be intriguing to investigate whether these religious observances result in time-dependent anomalies.

Authors' Contribution

Nang Biak Sing conceptualized the study and developed qualitative and quantitative methodologies to conduct the empirical research. Dr. Lal Ropuii collected data, developed the conceptual framework, and identified the research gap. Prof. Rajkumar Giridhari Singh established the methodological protocol and supervised the study. Nang Biak Sing wrote the manuscript in consultation with co-authors.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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