

The Influence of Holidays on the Yield and Volatility of United States Stocks

Lang Tang¹, Qi Wu^{2*}, Ruiqi Zhang³

¹*GCTB-NSU Joint Institute of Technology at Guangzhou College of Technology and Business, Guangzhou College of Technology and Business, Guangzhou, China*

²*Business School, University of Bristol, Bristol, United Kingdom*

³*Tianjin Foreign Languages School Affiliated to Tianjin Foreign Studies University, Tianjin, China*

**Corresponding Author. Email: lc24417@bristol.ac.uk*

Abstract. The U.S. stock market serves as a global financial hub, with its price fluctuations exerting significant influence on the world economy. As the importance of holidays grows, stock markets often exhibit abnormal return volatility during these periods. This study therefore examines the holiday effect's influence on U.S. stock returns and volatility. It focuses on whether the holiday effect is broadly present in the U.S. market and whether specific holidays exhibit more pronounced effects. Additionally, it investigates whether industries with demand highly correlated to holidays demonstrate stronger holiday effects. Using returns and volatility as dependent variables and holiday windows as independent variables, regression analysis determines the existence of the holiday effect. When considering official holidays as a whole, the holiday effect is not significant. For specific major holidays like Christmas, a significant holiday effect is present in the market. Industries with demand expectations highly correlated to holidays exhibit a more pronounced positive holiday effect. This paper enriches holiday effect research from industry and holiday type perspectives, providing empirical evidence and reference for investors' planning during holiday windows.

Keywords: Holidays, yield and volatility, United States stocks.

1. Introduction

In modern financial markets, asset price fluctuations are influenced by multiple factors. These encompass not only “rational” elements such as macroeconomic indicators and corporate attributes like scale, but also “irrational” factors including investor behavior and psychological biases. Consequently, with the advancement of behavioral finance, an increasing number of scholars have explored systematic anomalies present in markets. Among these, the holiday effect stands as a long-standing phenomenon of significant interest to both academics and practitioners.

The holiday effect refers to the phenomenon where stock market returns and volatility deviate significantly from their normal state during trading days immediately preceding or following major holidays [1]. Researchers documented evidence of this effect in the late 1980s. More specifically,

studies conducted in the U.S. market indicated that pre-holiday returns were 23 times higher than on other days and 2 to 5 times higher than average pre-weekend returns [2].

Studies indicate that U.S. stock markets often exhibit abnormal positive returns with relatively low volatility around trading days. This phenomenon contradicts the Efficient Market Hypothesis in traditional finance theory, sparking extensive debate and research [3]. The holiday effect manifests not only in yield variations but also significantly impacts market volatility. Typically, trading volume declines markedly before major holidays like Thanksgiving and Christmas, as many investors and traders take time off. While this reduced volume should theoretically lower market volatility and moderate stock price movements, the reality proves more complex. Low-volume environments often reduce market liquidity, potentially amplifying price fluctuations, especially when unexpected news or large transactions occur. The mechanisms behind the holiday effect are diverse and complex, primarily explained through three dimensions: investor behavior, market structure, and seasonal factors.

This study utilizes S&P 500 index data from every trading day between 2015 and 2025. The methodology follows Parkinson's approach to estimating intraday volatility, where the difference between the highest and lowest prices better reflects return variance than the difference relative to the closing price [4]. This metric directly captures price amplitude. To mitigate interference from abnormal fluctuations, a five-day moving average smoothing technique is applied.

The study treats pre-holiday status as the core independent variable, while controlling for trading volume and prior-period returns. This approach isolates the pre-holiday effect from inherent market volatility. After controlling for fundamental market characteristics, the analysis examines whether pre-holiday trading days significantly alter market volatility levels, thereby assessing the existence and statistical significance of the holiday effect in the U.S. stock market. This study aims to systematically analyze the impact of holiday effects on U.S. stock returns and volatility. Through historical data review and empirical analysis, it reveals market performance characteristics during different holidays, explores underlying formation mechanisms, and provides practical guidance for investors. The subsequent structure is as follows: Section II reviews key empirical findings on holiday effects; Section III analyzes the formation mechanisms of holiday effects; Section IV discusses investment implications of holiday effects; and the final section presents conclusions and future directions.

2. Research design

2.1. Data and research methods

This study analyzes major U.S. holidays that cause U.S. stock markets to close. Holidays include Christmas, New Year's Day, Independence Day, Labor Day, Martin Luther King Jr. Day, Presidents' Day, Memorial Day, Good Friday, and Thanksgiving. For fixed-date holidays, the preceding day's date was directly obtained, and non-trading days were excluded. For floating holidays, calculations were performed according to the U.S. federal holiday schedule. Subsequently, a variable representing the day before each holiday was constructed. If a trading day was the closest trading day to a holiday, the variable took a value of one; otherwise, it was zero.

This paper obtained data for Exchange Traded Funds (ETFs) and stocks across multiple sectors—such as financial and consumer staples—from the FintHub.io database (<https://fintHub.io/>) using a personal API key. The data spans from 2015 to 2025. Selecting ETFs across multiple sectors facilitates testing whether holiday effects vary between industries. The raw data consists of minute-level ticker data containing timestamps, open prices, high prices, low prices, close prices, and

trading volumes. To study daily holiday impacts, this study converts raw data into daily line data. Specifically, timestamps in seconds are converted to standard date-time formats, then indexed by date-time. Subsequently, the resample ('1D') method in Pandas was used to aggregate data by trading day. The following fields were extracted: opening price (first trade of the day), high price (highest trade of the day), low price (lowest trade of the day), closing price (last trade of the day), and volume (total trades for the day) [5]. To ensure data validity, weekends and market holidays were excluded. The final daily data set comprises six fields: date, opening price, high price, low price, closing price, and trading volume. Additionally, SciPy was employed to perform descriptive statistics calculations [6].

This paper also collected Volatility Index (VIX) data from 2015 to 2025 as a control variable. This data originates from the Federal Reserve Economic Data (FRED) repository. Furthermore, S&P 500 data from 2015 to 2025 was sourced from the IC Markets database.

To more intuitively capture short-term market fluctuations from the previous day, this paper employs the price range method—the difference between the high and low prices—as a volatility metric. This indicator directly reflects price amplitude. To better mitigate interference from abnormal fluctuations, a five-day moving average is applied for smoothing.

$$Volatility_t = High_t - Low_t \quad (1)$$

$$AverageVolatility_t = \frac{1}{5} \sum_{i=0}^4 (High_{t-i} - Low_{t-i}) \quad (2)$$

This paper employs statsmodels (SM) in Python 3 to establish an ordinary least squares (OLS) regression model [7, 8]. The core independent variable is whether the trading day preceding a holiday qualifies as such. Trading volume and prior-period returns serve as control variables, enabling separation of the holiday effect from inherent market volatility. After controlling for fundamental market characteristics, this paper examines whether pre-holiday trading days significantly alter market volatility levels, thereby assessing the existence and statistical significance of the holiday effect in U.S. equity markets.

2.2. Variable explanation

This study employs two approaches to define the holiday-preceding dummy variable. The first approach treats the day preceding all holidays as a single dummy variable. Subsequently, this variable and the control variables are incorporated into an ordinary least squares (OLS) regression model. The model is as follows.

$$Volatility_t = \alpha + \beta_1 PreHolidays_t + \beta_2 LogVolume_t + \beta_3 LagReturn_t + \varepsilon_t \quad (3)$$

The second approach adopted in this paper treats the day preceding each distinct holiday as a dummy variable. This paper employs this method to capture the holiday effect preceding different holidays. The model is as follows.

$$Volatility_t = \alpha + \sum_{j=1}^9 \beta_1 PreHolidays_{jt} + \beta_{10} LogVolume_t + \beta_{11} LagReturn_t + \varepsilon_t \quad (4)$$

$\sum_{j=1}^9 \beta_1 PreHolidays_{jt}$ is a virtual variable group for the trading day preceding the holiday. If the day is the trading day before the holiday, the virtual variable takes the value of one. If not, the variable takes the value of zero.

3. Research findings

3.1. Descriptive statistics

Table 1. S&P 500 descriptive analysis

Variable	Count	Mean	Median	Std	Min	Max	Skewness	Kurtosis	NaN Count
open	2719	3480.936775	3135.91	1190.980361	1830.1	6283.45	0.54387	-0.785134	0
high	2719	3504.952747	3158.25	1198.839713	1851.5	6296.3	0.538271	-0.795077	0
low	2719	3455.824277	3116.76	1182.756255	1807.75	6248.25	0.549448	-0.775106	0
close	2719	3482.735771	3139.49	1191.483819	1830.13	6282.25	0.543919	-0.783983	0
volume	2719	51678.67671 9	34023.0	55786.99951 9	815.0	392322.0	2.241114	6.319687	0
return	2718	0.000473	0.00071	0.011167	-0.10609 9	0.101465	-0.17272 8	14.311766	1
volatility	2719	49.12847	38.05	41.21166	3.05	642.45	3.331399	25.81256 5	0
log_volum e	2719	10.33388	10.43479 2	1.066682	6.703188	12.87983 8	-0.119206	-0.646579	0

Table 2. JETS descriptive analysis

Variable	Count	Mean	Median	Std	Min	Max	Skewness	Kurtosis	NaN Count
open	2489	24.013518	23.25	5.218242	11.8	34.81	0.081179	-1.150537	0
high	2489	24.260459	23.49	5.168585	12.265	34.9	0.085463	-1.161546	0
low	2489	23.751137	22.97	5.266228	11.26	34.27	0.072912	-1.130069	0
close	2489	24.010131	23.24	5.211294	11.8	34.9	0.079516	-1.144768	0
volume	2489	2451853.700683	126686.0	3665104.868378	100.0	33532619.0	2.679346	11.13844	0
return	2488	0.000258	0.000426	0.021842	-0.207136	0.186875	0.233908	13.529211	1
volatility	2489	0.509322	0.42	0.404547	0.0	7.75	4.545963	50.641384	0
log_volume	2489	12.23383	11.749467	3.078551	4.6017	17.328029	-0.158976	-1.505053	0

Table 3. XLV descriptive analysis

Variable	Count	Mean	Median	Std	Min	Max	Skewness	Kurtosis	NaN Count
open	2552	103.72626	96.825	26.908446	63.15	157.45	0.220993	-1.421794	0
high	2552	104.377554	97.9275	27.053385	63.945	157.84	0.215865	-1.428827	0
low	2552	103.014891	95.69	26.761074	56.63	156.65	0.222975	-1.416085	0
close	2552	103.725378	97.115	26.904919	63.54	157.17	0.219374	-1.423957	0
volume	2552	9397721.691223	8333464.5	4893657.699886	100.0	53870897.0	2.164012	9.178433	0
return	2551	0.000328	0.000706	0.010327	-0.075396	0.063686	-0.137071	5.530074	1
volatility	2552	1.362663	1.16	0.914348	0.0	14.44	2.931998	22.256622	0
log_volume	2552	15.826148	15.93579	1.280807	4.60517	17.802101	-6.820689	51.406771	0

As shown in Table 1, the S&P 500 price rose from a low of approximately 1,830.1 to a high of 6,283.45 during the 2015-2025 period. The mean yield was 0.000473, with a standard deviation of 0.011167. The maximum yield reached 0.101465, and a minimum of -0.106099. This indicates an upward trend for the S&P 500 over the decade. The average trading volume was 51,678.6767, with a

median of 34,023.0000, standard deviation of 55,786.9995, skewness of 2.2411, and kurtosis of 6.3197. This indicates that S&P 500 trading volume amplifies during specific periods.

As shown in Table 2, the JETS Aviation ETF recorded a minimum value of 11.8000 and a maximum value of 34.8100 during the 2015-2025 period, with a standard deviation of 5.2182. Its mean return was 0.000258, standard deviation 0.021842, maximum value 0.186875, with a minimum of -0.207136. The mean volatility was 0.5093, maximum volatility 7.7500, skewness 4.5460, and kurtosis 50.6414. This indicates significantly higher volatility relative to the S&P 500, reflecting the sector's sensitivity and extreme volatility during crises. The mean trading volume is 2,451,853.7007, but the median is only 126,686.0000, further indicating the aviation sector ETF's significant volatility and risk far exceeding the broader market.

As shown in Table 3, the XLV Healthcare Sector ETF has an opening price mean of 103.7263, a maximum value of 157.4500, a minimum value of 63.1500, and a standard deviation of 26.9084. Its yield mean is 0.000328 with a standard deviation of 0.010327, a maximum value of 0.063686, minimum of -0.075396, volatility mean of 1.3627, maximum of 14.4400, skewness of 2.9320, and kurtosis of 22.2566. Although the distribution exhibits fat-tail characteristics, it remains overall manageable. The mean trading volume is 9,397,721.6912, with a median of 8,333,464.5000. This indicates that JETS exhibits low volatility, ample industry liquidity, and a relatively stable distribution with defensive characteristics.

3.2. Research findings

Table 4. Regression result

		coef	std err	t	P> t
S&P500	PreHolidays	4.3662	4.010	1.089	0.276
	PreChristmas	29.8414	11.255	2.651	<0.01
	Volume	23.8912	0.456	52.443	<0.01
	Return	97.4491	43.424	2.244	0.025
JETS	PreHolidays	-0.0046	0.046	-0.099	0.921
	PreMLK	-5.571e-17	2.1e-17	-2.655	<0.01
	Volume	0.0384	0.002	21.752	<0.01
	Return	-0.8923	0.249	-3.584	<0.01
XLV	PreHolidays	-0.0651	0.114	-0.573	0.567
	PreMLK	1.287e-16	7.76e-17	1.659	0.097
	Volume	0.0834	0.011	7.716	<0.01
	Return	-2.5608	1.332	-1.922	0.055

As shown in Table 4, for the S&P 500, when the trading day before Christmas is included as a variable, the results are significant with a coefficient of 29.8414. Both trading volume and return in the control variables are significant. This indicates a positive correlation between the trading day before Christmas and volatility. When all trading days are included as variables, the results are not significant. For JETS, when the trading day before Martin Luther King Jr. Day is used as a variable, the results are significant. The coefficient equals -5.571e-17. Both trading volume and return in the control variables are significant. This indicates a negative correlation between the trading day before Martin Luther King Jr. Day and volatility. When all trading days are used as variables, the results are

not significant. For XLV, results were not significant whether all holidays or the single holiday's preceding trading day was used as a variable. Both volume and return in the control variables were significant.

The results indicate that the overall holiday effect is insignificant, but specific holiday effects are pronounced. When treating all official holidays as a unified variable, the holiday effect for the overall U.S. stock market (e.g., S&P 500) is statistically insignificant (e.g., S&P 500 PreHolidays coefficient = 4.3662, $p=0.276$). However, the trading day preceding specific major holidays significantly impacts market volatility, with the strongest effect observed for Christmas—volatility in the S&P 500 significantly increases on the day before Christmas (coefficient = 29.8414, $p < 0.01$). This indicates concentrated trading activity among investors ahead of traditional major holidays, triggering abnormal volatility. The Martin Luther King Jr. Day (MLK) effect shows divergence: Volatility in the air travel sector (JETS) significantly declines before MLK Day (Coefficient = $-5.571e-17$, $p < 0.01$), potentially linked to reduced trading activity due to holiday planning.

Industry performance exhibits heterogeneity, with demand-sensitive sectors showing more pronounced effects. Holiday effects significantly differ across industries, being more pronounced in sectors highly correlated with holidays. Demand-sensitive industries like air travel (JETS) and food service/retail experience notable volatility and return changes due to direct holiday-driven consumption expectations (e.g., JETS' significant MLK effect). The healthcare sector (XLV) showed no significant holiday effect (PreHolidays coefficient = -0.0651, $p=0.567$), reflecting healthcare's non-seasonal demand patterns. This confirms “sector-specific demand expectations” as the key mechanism driving the effect.

Control variables validate inherent market patterns. Both trading volume (LogVolume) and lagged returns (LagReturn) significantly influence volatility as control variables. Increased volume amplifies volatility (S&P 500 coefficient = 23.8912, $p<0.01$), reflecting the fundamental role of market activity. The previous day's return negatively correlates with the current day's volatility (JETS coefficient = -0.8923, $p < 0.01$), suggesting that return continuity may suppress short-term volatility.

4. Discussion

Overall market research findings indicate that when all holidays are considered collectively, the holiday effect does not exhibit a significant impact in the U.S. stock market. This result diverges from the hypothesis proposed in preliminary behavioral finance studies—namely, that the positive social atmosphere generated by holidays boosts investor confidence in investment activities, thereby driving abnormal market returns. Therefore, this paper disaggregated the overall holiday period for individual analysis. This paper found that Christmas, as a traditional holiday, exhibits a pronounced holiday effect. The data suggests that holidays with greater cultural influence tend to yield more pronounced holiday effects. However, the metric of cultural influence is ambiguous: how to determine which of two holidays holds greater cultural influence, and whether the same holiday carries differing cultural weight across nations. Research on the holiday effect in the Swedish market indicates that between 1980 and 2019, only the New Year holiday exhibited a significant holiday effect in the overall market, while no such effect was observed during the Christmas window [9]. Further exploration and research are therefore warranted in this area.

From an industry-specific perspective, the study found that the XLV healthcare sector exhibited no significant holiday effect during any holiday period. The preliminary hypothesis proposed that anticipated industry demand during holidays significantly influences the effectiveness of holiday effects on sectors. XLV's classification within healthcare implies it lacks inelastic demand, as

pharmaceutical consumption exhibits minimal seasonality. The hypothesis is positively corroborated by another sample, the JETS aviation and tourism sector, which exhibits a significant holiday effect during the MLK holiday. Additional research supports this hypothesis. Scholars studying the holiday effect in the restaurant industry note that it is widespread in the U.S. restaurant sector with positive abnormal returns, indicating the holiday effect has a significant positive impact on industries with high anticipated demand like restaurants [10]. This conclusion supports findings. However, Kudryavtsev's research indicates that smaller-cap companies exhibit greater influence during holiday windows due to their limited asset information fundamentals [11]. Since the study focuses exclusively on large-cap companies, future research addressing this gap could yield more universally applicable results.

In summary, this research offers actionable trading strategy recommendations for investors and provides empirical evidence for regulators to mitigate abnormal volatility risks. For investors seeking positive excess returns through the holiday effect, actively considering its heterogeneous performance across industries is essential. For instance, strategic allocation to sectors like catering and transportation/tourism—which exhibit high anticipated demand—can help capture potential excess returns. For regulators, while the holiday effect does not broadly permeate the market, heightened oversight is warranted in sectors prone to short-term speculation—such as aviation and retail—to prevent market manipulation and excessive speculation. Furthermore, given regional cultural variations, the holidays requiring enhanced regulation differ across locations. Strengthening oversight should be tailored to objective circumstances to achieve greater effectiveness and minimize waste of human resources.

5. Conclusion

Based on empirical analysis of U.S. stock market data from 2015 to 2025, this study finds that holiday effects significantly influence stock volatility and returns, yet their impact exhibits pronounced holiday specificity and sector heterogeneity. Holiday effects are not a universal pattern across U.S. equities but concentrate in holidays and industries with strong cultural influence and high seasonal demand. Investors should precisely identify holiday-industry combinations, while regulators should dynamically manage specific window risks to enhance market efficiency.

Based on these findings, the following recommendations are proposed: Investors should prioritize allocating to holiday-demand-sensitive sectors (e.g., tourism, retail) to capture excess returns during windows like Christmas. Avoid sectors with stable demand (e.g., healthcare) to prevent ineffective trading. Relevant authorities should strengthen monitoring of holiday-impacted industries (e.g., aviation, retail) to curb speculative activities (e.g., the abnormal volatility of JETS before MLK Day). Regulatory intensity should be dynamically adjusted based on regional cultural differences (e.g., stricter oversight of U.S. stocks during Christmas).

This study has limitations. While it confirms the significance of specific holidays like Christmas and MLK Day, the quantifiable standards for cultural influence remain ambiguous (e.g., Christmas has no effect on the Swedish market). Future research should incorporate cross-cultural comparisons (e.g., the impact of Chinese New Year on the Chinese stock market) to deepen the analysis of the transmission mechanism between “social sentiment and investment behavior.”

Authors contribution

All the authors contributed equally and their names were listed in alphabetical order.

References

- [1] Vidal-García, J. and Vidal, M. (2024) The holiday effect.
- [2] Pinto, P., Bolar, S., Hawaldar, I.T., George, A. and Meero, A. (2022) Holiday effect and stock returns: Evidence from stock exchanges of Gulf Cooperation Council. *International Journal of Financial Studies*, 10(4), 103.
- [3] Delcey, T. (2021) A tale between finance and economics: Four essays on the history and methodology of the efficient market hypothesis (Doctoral dissertation, Université Panthéon-Sorbonne-Paris I). <https://theses.fr/s222632>
- [4] Parkinson, M. (1980) The extreme value method for estimating the variance of the rate of return. *Journal of Business*, 53(1), 61–65.
- [5] The pandas development team. (2020) pandas-dev/pandas: Pandas (Version 1.0.3). Zenodo.
- [6] Virtanen, P., Gommers, R., Oliphant, T.E., Haberland, M., Reddy, T., Cournapeau, D., van Mulbregt, P. (2020) SciPy 1.0: Fundamental algorithms for scientific computing in Python. *Nature Methods*, 17(3), 261–272.
- [7] Python Software Foundation. (2023) Python: A dynamic, open source programming language (Version 3.x). <https://www.python.org/>
- [8] Seabold, S. and Perktold, J. (2010) Statsmodels: Econometric and statistical modeling with Python. *Proceedings of the 9th Python in Science Conference*, 57–61.
- [9] Eidinejad, S. and Dahlem, E. (2022) The existence and historical development of the holiday effect on the Swedish stock market. *Applied Economics Letters*, 29(19), 1855–1858. <https://doi.org/10.1080/13504851.2021.1984540>
- [10] Chiu, C.N. (2020) Holiday effects on stock prices of the restaurant industry. *Current Issues in Tourism*, 23(9), 1109–1121.
- [11] Kudryavtsev, A. (2019) Holiday effect on large stock price changes. *Annals of Economics and Finance*, 20(2), 633–660.