

Timing is Everything: How the Turn of the Month Affects Stock Market Returns - Crisis vs Regular Times

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Abstract

This study investigates the Turn of the Month (TOM) effect in the Pakistan stock market by examining its presence during stable market periods and crises from the year 2011 to 2022. The TOM effect which is characterized by a brief surge in stock prices occurring in the last few days of one month and the first few days of the next, is analyzed using the KSE-100 Index. A year-by-year analysis reveals that the TOM effect is significant only between the year 2011 and 2016 which diminishes in the years 2017 to 2022, likely due to economic instability and market upheavals. The findings suggest that this anomaly may dissipate during periods of heightened market volatility, distinguishing the TOM effect from other calendar anomalies. This study highlights the importance of monitoring market anomalies for regulatory adjustments and suggests that investors and institutions should adopt robust risk management strategies in response to increased unpredictability. Moreover, the changing behavior of an investor highlights the need for further behavioral finance research, with advanced techniques necessary to fully grasp evolving market dynamics. These insights provide a fresh perspective on the TOM effect in the context of the Pakistan stock market by offering practical implications for policymakers, investors, and analysts alike.

Keywords: Market Anomalies; Turn of the month effect; PSX; Calendar Anomalies; StockReturns; Crisis vs Regular Times

1. Introduction

The effectiveness of the global stock market has been examined in depth by asset pricing research, which has uncovered different anomalies connected to both seasonal trends and the psychological aspects. Contrary to the efficient market hypothesis, which mainly suggests that these deviations can be eliminated through arbitrage and these deviations continue for longer periods. This persistence emphasizes the need for more in-depth scholarly research in this area. (Tadepalli & Jain, 2018). While some stock market anomalies are temporary, and others are long-lasting. One anomaly the "day of the week effect" posits that specific days yield the most significant stock returns. Conversely, a renowned "month of the year effect," commonly referred to as "January effect," suggests that profit peaks in January. Moreover, it highlights that returns are notably stronger in the initial few trading days of the month compared to the latter half (Irtiza et al., 2021).

Several anomalies of calendars include “Day of the Week Effect”, “Turn of the Month Effect”, “Month of the Year Effect”, “January Effect”, “Holiday Effect”, and “Halloween Effect”, which have been discerned in the stock markets recognized as the peculiar anomalies. Investigating the return patterns that is linked to specific calendar events, such as daily fluctuations, monthly trends, and holidays constitutes the primary objective of the research mainly focused on these anomalies. (Kaur et al. (2019). These calendar anomalies challenge the efficiency of the stock market by revealing the cyclic inconsistencies in earnings which are associated with specific calendar markers (Kayacetin & Lekpek, 2016). The market demonstrates changing investor behaviors by specific days of the week, specific times in a day, and even particular seasons, as postulated by the calendar time hypothesis. (Rossi, 2015). The “Turn of the Month” anomaly has garnered significant attention in the different financial markets among all the anomalies of the calendar. Ariel (1987) carried out one of the early investigations that spans the years from 1963 to 1981, and discovered different patterns in daily mean returns around the TOM, and of that particular significance were the ten trading days following the TOM, during which the above-average returns were observed in comparison to the preceding eight trading days. Importantly, Ariel (1987) have shown the importance of this anomaly even after accounting for seasonal factors like the January Effect in their studies.

The defining feature of the TOM is the irregular dispersion of the return of the stock market throughout the month. A concentrated surge in the returns tends to concentrate during this anomaly, which encompasses a few days at the tail end of the previous month and the initial days at the new one which is manifested in the stock market (Arendas & Kotlebova, 2019). The existence of irregularities in the stock market raises some questions about the validity of market efficiency. The term "efficient market," originated from Fama (1970) work defines a market the security prices meticulously incorporate all the accessible information and in this realm it is exceedingly difficult to achieve excess gains. Jensen (1978) emphasized that investors do not have the opportunity to earn abnormally high returns in an efficient market. However, the discovery of predictable stock return patterns which is referred to as "anomalies," which challenge the very essence of the efficiency of the market. These anomalies signifies that there are circumstances where certain investment strategies can yield abnormal returns, which suggests that the markets might not always be perfectly efficient as theorized. While (Cadsby, 1992) found the substantial “TOM” impacts in six of the ten global markets. It has been discovered that the discernible “Turn-of-the-Month” effect permeates the intricacies of the stock market of US (Ariel (1987). Aziz and Ansari (2018) meticulously scrutinized an inclination of the returns of stocks to surge during this anomaly period across the 18 developed markets. Lee and Kim (2022) reported this effect to occur within the landscape of the stock market of KOSDAQ. The “Turn-of-the-Month” effect's presence was corroborated within the Pakistan stock market, spanning from the years 2013-2018 (Irtiza et al., 2021). This study also delves into this anomaly which emerges during particular days of months in the stock market of Pakistan, scrutinizing the data encompassing both regular and the crisis periods from January 2011 to December 2022.

This study uses the Time series data utilizing the "KSE-100 Index, and taking the closing prices that spans from the year 2011 to 2022. A meticulous year-by-year analysis was conducted in the context of Pakistan: the presence of the TOM (Turn of the Month) effect is only a notable regular (2011-2016) period, but its significance wanes from 2017-2022 crisis time period. This

observation suggests that this anomaly might diminish amid fluctuations in the stock market and an economic instability which indicates a distinct trend. Our findings differentiate the TOM effect from other calendar anomalies by highlighting its robust and statistically significant impact on the KSE-100 index from 2011 to 2022. By utilizing various statistical techniques such as, t-tests, regression analysis, generalized linear models (GLM), non-parametric tests (WSR), and F-tests, this study revealed a robust TOM effect during the regular period. This effect was characterized by a significantly higher average return on anomaly days as compared to non-anomaly days which indicates a potential trading opportunity for investors. However, the anomaly effect substantially weakened during the crisis, with the negative returns observed on the days surrounding the “anomaly period”. Lastly, The WSR test confirmed the TOM effect during the regular period but not during the crisis which suggests the susceptibility to external influences. Political upheaval in the year 2017-2018 and the COVID-19 pandemic disrupted the regular patterns which emphasized the impact of external factors on the anomaly.

The primary aim of this study is to examine the effect of the “Turn of the Month Effect” on stock market return in the context of “PSX”. This research paper contributes significantly in several respects. Firstly, it sheds light on the Turn of the Month (TOM) effect which is a prominent calendar anomaly identified in the recent decades. Numerous studies have emphasized on the existence of various calendar anomalies across the global stock, bond, and the commodity market (Borowski, 2015; Giovanis, 2009; Lakonishok & Smidt, 1988; Milonas, 1991). Bouman and Jacobsen (2002) trace the origins of one such anomaly which is the Halloween effect, back to the late 17th century. While the TOM effect has been extensively examined in an emerging and developing countries, as well as in numerous other stock markets, its impact on the “Pakistan Stock Exchange (PSX)” during crisis versus normal periods remains largely unexplored. Secondly, this study stands out by conducting a comprehensive year-by-year analysis by comparing the returns during normal time periods (2011 to 2016) with those during the crisis time periods (2017 to 2022). This approach addresses a research gap and helps in distinguishing our research from previous studies.

The rest of the paper is organized as follows: Section 2 focuses on the "Review of Literature" section by offering a comprehensive overview of the most recent and pertinent literature concerning the topic at hand. Section 3, focuses on the "Methods" section delineates the methodology employed to examine the "turn-of-the-month effects" in the PSX. Section 4, covers the "Results and Discussion" section encapsulates the empirical analysis, pivotal findings, and an insightful discussion arising from the study. Finally, Section 5 covers the "Conclusions" section which provides a comprehensive summary and the conclusion of the research followed by limitations and future directions.

2. Literature Review

2.1. Regular period “TOM” effect

The exploration of anomalies in the calendar has a long-standing history in the field. It was identified during the investigation of this anomaly that a consistent pattern in securities' prices emerges during the concluding days of month and the three opening days of the subsequent month (Cadsby, 1992). Approximately 87% of the usual monthly return occurs within the specific four-

day period that is referred to as “turn-of-the-month” time frame (Kunkel et al., 2003). Ariel (1987) they unveiled the noteworthy trend that stock returns exhibit tendency to surge in initial half of a month, surpassing the performance of stocks observed in latter half. Furthermore, it was also observed that stock returns often displayed negativity in the latter half of the month. Additionally, multiple research studies have indicated consistently that returns on the day Mondays have exhibited a consistent pattern of lower performance in contrast to other week days (Wang et al., 1997). Moreover, certain studies have observed the seasonality even in intraday returns that indicates that the daily average return tends to be at peak at the commencement and conclusion of a trading day (Vidal & Vidal-García, 2022). This effect, according to Go and Lau (2023), could be attributed to timely dissemination of a monthly macroeconomic data. Pandey and Joshi (2022) discovered that the dissemination of the pivotal US macroeconomic news markedly influences both the TOM and intra-month fluctuations. The “Turn-of-Month effect” is substantiated by evidence spanning various nations and the historical periods. The TOM effect was validated in the USA by Ogden (1990), that attribute this phenomenon to the practice of standardizing the payments at the beginning of each month. This practice, which includes the transactions such as salaries and dividends, promotes an increased investment activity during the early days of the month.

In the study conducted by Singh et al. (2021) it was found that in 15 out of the 19 nations where (TOM) exists, the four-days TOM period mainly contributes significant portion of monthly average return that makes up to almost 87% of the total return in stock market. In US equities, Choi et al. (2018) presents the compelling evidence that support this TOM effect. Their study, which covers the period from the year 1926 to 2005, suggesting that investors were notably rewarded for assuming the market risk during the month transitions. Furthermore, this phenomenon is not confined to the US markets; extensive research across the 35 countries revealed the compelling trend in 31 of these nations which shows the influence of this phenomenon persisted. This anomaly is intricately shaped by the diverse factors, including initiation of activities by pension funds at the month commencement, fluctuations in the trading volume, and careful monitoring of investor liquidity requirement as observed by the Kamau (2022). Berger et al. (2022), analyzed various trading activity indicators and noted that the stock market prices and trading volume changes in response to the evolving investor demands and preferences throughout the day. Furthermore, higher profits are associated with the increased trading volume at the beginning of the month, that is possibly influenced by the buying pressure observed in the final stretch of month (Sintonen, 2021). Liquidity-need hypothesis proposes that an individual investor evaluates their liquidity requirements during the weekend and executes the sell orders at the commencement of the following week. The “information processing hypothesis” posits that over weekend, retail investors meticulously do the recalibration of their portfolio allocations (Gens, 2020). Fluctuations in stock prices are shaped by the activities of both an individual and an institutional investors. Sias and Starks (1995) discovered that stocks boasting the substantial institutional ownership exhibits more pronounced seasonal patterns in their behavior, contrasting with the stocks possessing lower institutional ownership. This strategic allocation coincides with a schedule of dividend and the interest disbursements towards month's conclusion, according to Nukala and Prasada Rao (2021). In the study from the Pakistani perspective, Irtiza et al. (2021) uncovered compelling evidence which substantiates the diverse calendar anomalies, notably the “turn-of-the-month effect”, within the Islamic equity market in Pakistan. The "monthly effect" was also

confirmed to exist in the Pakistan Stock Exchange (PSX) by Quayyoom et al. (2017). Recent research has identified three distinct market abnormalities in the PSX, "day of the week effect," "monthly effect," and "weekend effect" according to Anjum (2020). Unlike the TOM, numerous studies have been unsuccessful in uncovering the supporting evidence for this effect. For instance, Wong et al. (1992) didn't uncover any evidence of "turn-of-the-month" effect during their analysis of this calendar irregularities within the stock market of Singapore. Arsal et al. (2011) discovered scant empirical evidence supporting this phenomenon across various stock markets. The stock exchange of Amman similarly yielded the sparse evidence supporting the presence of this effect according to Al-Jarrah et al. (2011).

H1: There exists a significant turn-of-the-month (TOM) effect in the Pakistan stock market during the normal period, characterized by a discernible difference between TOM and rest-of-the-month (ROM) returns.

2.2 Crisis period "TOM" effect

The "TOM" effect, a fascinating phenomenon in the financial markets, means the intriguing pattern where stock prices exhibit a distinct increase during the closing days of one month and the initial days of the subsequent month, that set them apart from the market behavior during the rest of a month. (Ariel, 1987; Lakonishok & Smidt, 1988). This effect has been documented globally in several stock markets, including the Greek stock market (Norvaisiene & Stankeviciene, 2022), the Indian stock market (Maher & Parikh, 2013), and the Chinese and the Philippine stock markets (Chang et al., 2023). Numerous researches have investigated the presence of this effect across the different financial markets and historical time periods. Also, the research carried out over the years 2013 to 2018 investigated this market anomaly from the stock market of Pakistan. The researchers' findings revealed a noteworthy pattern that this effect shines through only when a span of the years of 2013 to 2016 is taken into consideration. Moreover, this unique attribute was also missing in the years between 2017 and 2018. This slump occurred simultaneously with that crucial period distinguished by the exacerbated political instability and the financial turmoil. This discovery supports the theory by Wong et al. (1992) that as more investors intend to capitalize of this effect and consciousness of it becomes common, the effect would not be allowed to exist or diminish in great measure. A myriad of empirical studies that analyze this influence from the markets of varied international financial institutions present contradictory results. Certain studies bring evidence to reduce the TOM influence, and Chwert (2003) is among those that find the justifications for that. However, it was highlighted that the point that the profit opportunities will be reduced if the intraday traders increase the investor attention and trading activity due to the regulatory restrictions as well as market conditions and updates of trading techniques. The disparities seen in the research findings from the "TOM effect" can be attributed to the different periods taken under analysis and the prevailing economic trends. Therefore, Vasileiou (2014) posits that the prevailing economic conditions of the time so could affect the modern omnibus effect. In particular, this effect could be even more emphasized during market stability periods or the next cycles of growth, but on the other hand, such effect could be reduced during economic instability and market volatility. Moreover, Vasileiou and Samitas (2015) claimed that the intensity and the value of the t-test significance can be dependent on the length of the investigation window. The lengthened observation period could make this

effect even stronger or eliminate it, whereas shorter window would make it more intense. It is (Vasileiou, 2014) the effect of the Euro in the Greek market, as the study (Vasileiou, 2014) shows the anomaly conduct in this period. Thus, the impact might be strong in the periods of either the growth or stagnation rather than the periods of the recession, though there's no consensus on which one and why. This implies that therefore the economy plays the main role in the TOM effect, the economy throws wide during the periods of financial stability and the growth and reducing its effect in the times of crisis and recession.

The existing anomaly effect in the stock markets of China and Philippines in the period which begins from 1st January 2008 and ends on 31st March 2009 has been studied. The evidence from this research suggests that in most of these markets there is no statistically significant difference in the returns of the "TOM" (time of market) and "ROM" (return of market). This Probably be associated with a small or even no effect during the crisis in these markets. Therefore, this phenomenon can be linked to the herd behavior that is present in some literature (Bikhchandani & Sharma, 2000), while the absence of TOM or return momentum in the period of financial crisis is assigned to the investors' tendency to follow the crowd, rather than keeping a critical approach in times of market uncertainty and high volatility. This herd-like action deprives the market of predictability to this measure. Further, it is necessary to say that the existence of the TOM effect is not subject to the stock markets of both the Philippines and the Chinese in the time of financial hardship. The unexpected political instabilities, for example, the resignation of former Pakistani Prime Minister Nawaz Sharif due to the events like "Panama Leaks" have made a serious distortion in the Pakistani market during the wheel of 2017 and 2018. Crapitalism which is the result of the development of crony capitalism in the country, contributes to the emergence of these effects (Irtiza et al., 2021)

In 2017, Pakistan's stock market experienced a notable 20% decline, having earned the distinction of being Asia's worst-performing market. During this time period, media outlets speculated that this decline would likely persist until the 2018 general elections (Nisar & Yeung, 2018). Indeed, during this decline, Pakistan experienced a 1.56-fold increase in the current account deficit, and the country's foreign exchange reserves saw a significant decrease to about 20%. Additionally, this effect disappeared during the pandemic, the period which was marked by government-imposed lockdowns, slowing economic activity, and altered pay schedules that were no longer strictly aligned with the beginning or ending of the month. This underscores the notion that this effect or anomaly is not a consistent phenomenon but a susceptible to environmental influences. Consequently, this anomaly effect vanished during the period of economic disruption.

H2: There does not exist the significant turn-of-the-month (TOM) effect in the Pakistan stock market during the crisis period, as there is no discernible difference between the TOM and the rest-of-the-month (ROM) returns.

3. Methodology

Toe et al. (2023) stressed the importance of distinguishing the TOM effect from the other time periods when analyzing its impact on stock market outcomes. Our study focuses on exploring how this phenomenon influences the stock market returns spanning from the year 2011 to 2022,

that encompasses both the stable and turbulent periods. The key metric which was employed in this study was the KSE-100 Index, that encompasses the leading hundred companies listed on the Pakistan Stock Exchange. Secondary data was sourced from the PSX website, specifically that focuses on the daily closing values of the KSE-100 Index spanning from the year 2011 to 2022. These figures were utilized to compute the average monthly returns of stocks, discerning the patterns during both regular market conditions and the periods marked by the financial crises. To conduct a comprehensive analysis of this KSE-100 Index returns, this quantitative research employed the census sampling method, that incorporates all the available data. The study's measurement unit was the average daily stock return.

In our research, we adhere to the specific definition of the this phenomenon, as outlined in the works of Lakonishok and Smidt (1988), Ogden (1990) and the Kumar (2022) despite the varied descriptions found in different studies. This standardized definition provides the clear framework for our analysis. In this research, a special feature declared as "TOM effect" is explored, which is an outcome of the specific behaviors of the market observed at the end of the final trading day of the past month with the introduction of the initial three trading days of the new month. It is to be remembered that the TOM window has been used by the other past researchers to support their investigation to conclude their research. Another example of this technique was Ariel (1987) which had the window covers activities on the last trading day of the last month and the start eight trading days of the following month. To the contrary, Lakonishok and Smidt (1988) and Liu et al. (2017) focused on the period that closed the last trading day of the month and opened the next trading days in their studies, ending on the 3rd trading day of the following month. In line with the findings of Liu (2013) and Kayacetin and Lekpek (2016), the authors used the various combination methods in conducting these research. For instance, examining the final two and the initial four trading days of each month were also analyzed. Using the following formula, the daily returns are calculated:

$$R_x = (P_x - P_{x-1})/P_{x-1}$$

In the provided equation, 'R_x' signifies the return generated on the day X, 'P_x' represents the closing price on day X, and 'P_{x-1}' denotes the closing price on the day immediately preceding to day X.

Initial investigations into the market anomalies highlighted the concerns regarding the application of traditional parametric tests such as the OLS regression and ANOVA. These concerns stemmed from the violations of fundamental assumptions within stock return series, potentially rendering these tests overly sensitive to even minor deviations, thus yielding inaccurate outcomes. However, in the context of the large samples, parametric tests are generally perceived as the robust, even in the presence of moderate assumption violations, although they can be more susceptible to the slight fluctuations in returns. In cases where OLS assumptions are not met, researchers have explored the non-parametric approaches as a viable alternative. These methods have demonstrated the comparable efficacy in detecting the differences in ANOVA, as evidenced by the various studies (Huntsman et al., 1983; McNeish, 2014). In our research, our focus centers on the specific timeframe: the final four trading days of the preceding month and the initial three trading days of the new month, that is collectively denoted as the TOM (Turn of the

Month) days. The days outside this period are categorized as the non-TOM days. Our objective is to evaluate the investment performance on both TOM and non-TOM days, aiming to determine the existence of the TOM effect under both normal market conditions and the crisis situations.

After confirming the existence of this period in both the normal and the crisis situations, we employ several statistical tests to assess its impact on the returns. Initially, we conduct a parametric test where returns are regressed on a dummy variable representing the TOM period. This approach helps us better understand the relationship between this anomaly and returns. To examine variations in the effect across different timeframes, we perform the three-way ANOVA, considering the potential interactions between the months and years, to assess the significance of this anomaly. Additionally, to account for the potential seasonal or monthly effects, we employ a nonparametric Wilcoxon signed-rank (WSR) test. This method, resistant to the distributional assumptions, allows us to analyze this anomaly's impact independently of the other seasonal patterns.

4. Data Analysis and Results

The complete dataset spanning from the year January 2011 to December 2022 was segmented into the two distinct time periods: the pre-crisis or the regular phase from January 2011 to December 2016 and the crisis phase from January 2017 to December 2022 in Pakistan. This division allowed for an investigation into the presence of the TOM effect during the crisis time. This study aimed to identify any significant differences or patterns in this effect during this crisis period by analyzing the data separately before and during the crisis time. To highlight important data features, this study begins with descriptive insights. Next, group means are compared using a T-test. The associations between variables are then modeled using regression analysis, and month and year effects are controlled for using the general linear model (GLM). Furthermore, non-parametric data are assessed using the Wilcoxon Signed-Rank test, and group variance is examined using the F-test.

4.1 Descriptive Analysis

In the Regular time period (2011-2016), the table depicts the data indicating a consistent trend with an average value (mean) of 0.17. This suggests that TOM days experienced higher returns. Throughout this period, moderate variations around the mean were observed, which is evident by a standard deviation of 0.81. Contrastingly, in the Crisis time (2017-2022), the mean substantially decreased to 0.03, depicting a shift in the behavior without a distinct turn-of-month phase. ROM days showed an average return of -0.02%, indicating slightly lower returns during this time. The standard deviation increased to 0.97, indicating higher daily return unpredictability likely influenced by the market turmoil. Notably, even amidst the crisis, the distribution of values remained remarkably symmetrical, albeit with a wider range, highlighting the greater sensitivity to changing circumstances.

Table 1

General Statistics of TOM and ROM

Period	N	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Regular Period							
2011-2016	1485	1.90	0.81	-4.33	3.87	0.00	0.00
TOM	516	0.17	0.86	-3.04	3.87	0.00	0.00
ROM	969	0.04	0.82	-4.33	2.70	0.00	0.00
Crisis Period							
2017-2022	1487	0.01	0.97	-5.6	3.87	0.00	0.00
TOM	577	0.03	0.95	-4.28	3.64	0.50	0.00
ROM	910	-0.02	0.951	-5.63	3.84	0.00	0.00
2011-2022	2972	0.04	0.90	-5.63	3.87	0.00	0.00

During this period, there was no skewness observed in the returns for both the TOM and ROM. However, turn-of-the-month returns during the crisis era exhibited the positive skewness without significant kurtosis. Bgody tests indicated the absence of the serial autocorrelation in the returns from both time periods. Although the Shapiro-Wilk test was initially employed to assess the normality, given the dataset's size, the results did not achieve the statistical significance. Consequently, non-parametric tests were utilized to delve deeper into the data.

4.2 Graphical analysis

The research conducted the meticulous analysis of the average index returns for each day of the month from the year 2011 to 2022 to precisely delineate the duration of this effect in the PSX (Pakistan Stock Exchange) market. Special focus was placed on the [-4, +3] day range and the subsequent days of the month. The graphical representations unequivocally demonstrate the significant upswing in the returns during the turn of the month period. In this context, "Day 1" signifies the first trading day of the month, "Day +1" marks the commencement of the following month, "Day +2" corresponds to the second trading day, and so forth. The TOM period was determined to encompass days -1 to +3, aligning with the prior research. Conversely, the days outside this period, excluding this period, are termed "Rest-of-the-Month" (ROM). Figure 1 illustrates the average daily returns for the year 2011, capturing the trend from day -4 to day +3. Remarkably, the data indicates that in the PSX market, day +2 and day +3 witness the highest average returns. Notably, returns for the interval [-4, +1] are also positive, that underscores their superiority over the ROM returns. Collectively, the last four days of the preceding month and the first four of the new month's exhibits the positive returns, significantly outperforming the returns observed in the second half of the month (ROM). This robust pattern supports the existence of this anomaly impact in 2011. Figure 2 provides numerical representations of average daily returns that spans from day -4 to +3. Days +2 and +3 stand out with significantly higher returns, especially day +2, which boasts the highest average return of 0.372%, that surpass the ROM's average return of 0.052%. This substantial disparity underscores the prevalence of the turn of month effect in 2012. Positive returns are also notable on days -4, -3, -2, and -1, albeit with slightly lower magnitudes compared to the typical returns on days +1, +2, and +3. This finding emphasizes the presence of this effect across the final four days of the previous month and the initial three days of the succeeding month. Similar discernible patterns with markedly positive turn of the month impacts are observed in 2013 and 2014, as depicted in Figures 3 and 4. Table

5 showcases the highest return (0.155%) occurring on day -4, the first day of the previous month, followed by the second-highest return on day -3, and so forth. Moreover, the average returns for the [+1, +3] intervals exhibit positive traits, surpassing the ROM's 0.05% in 2015. Figure 6 further accentuates these patterns, showcasing the peak average returns on days +2 and +3 in 2016. This compelling evidence underscores the undeniable presence of the TOM effect in the Pakistan stock market, substantiated by the consistent and significantly favorable disparities between TOM and ROM returns for each year from 2011 to 2016.

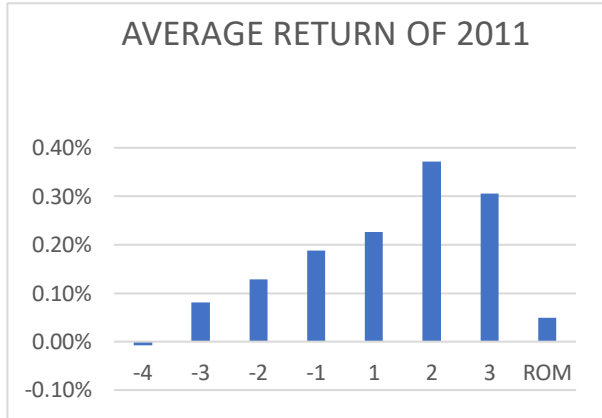


Figure 1

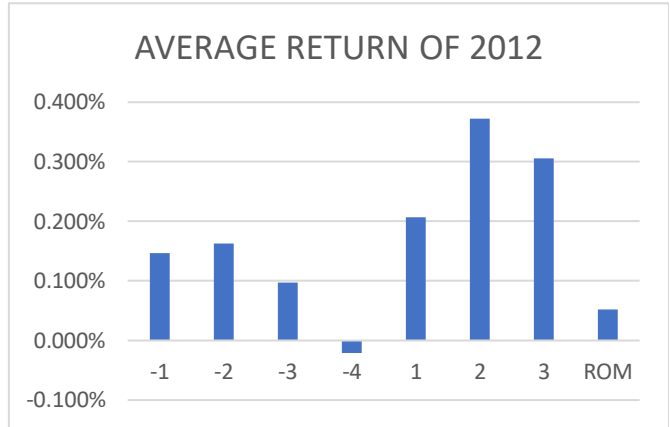


Figure 2

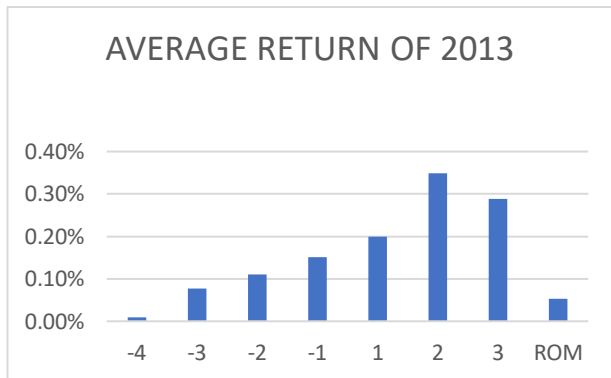


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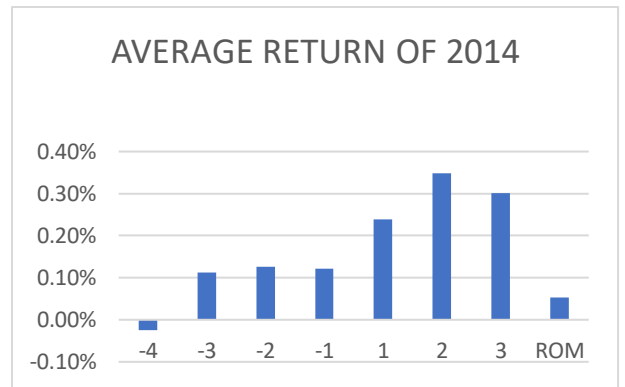


Figure 4

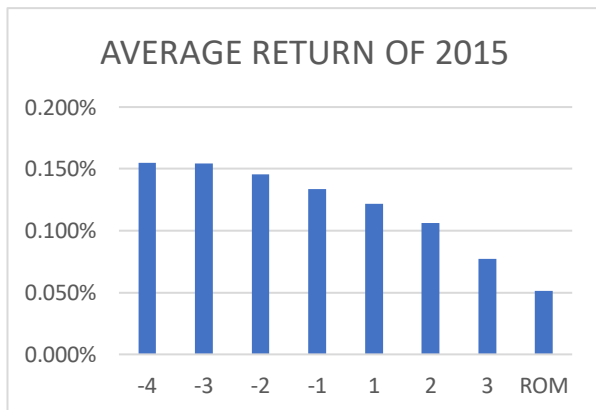


Figure 5

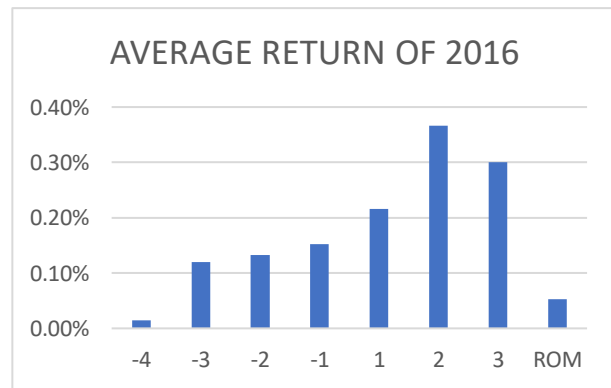


Figure 6

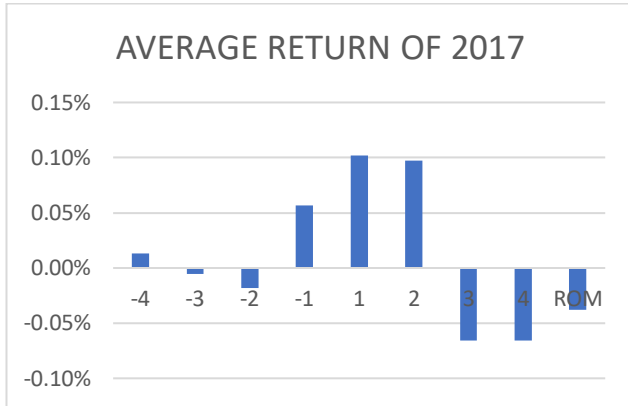


Figure 7

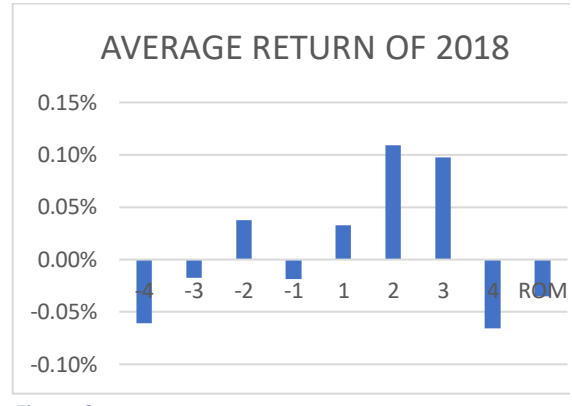


Figure 8

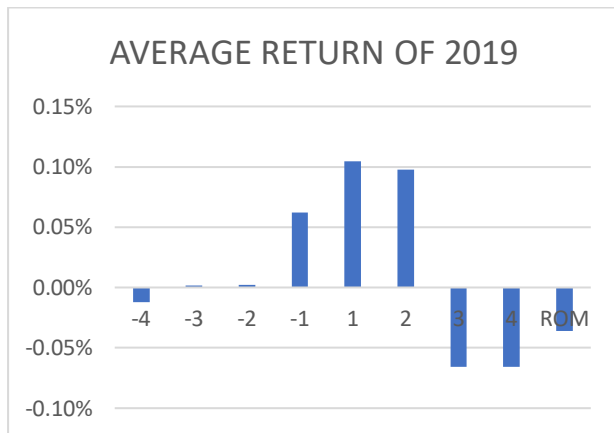


Figure 9

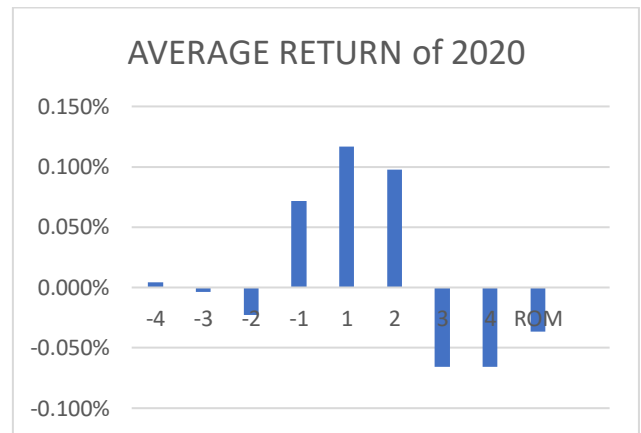


Figure 10

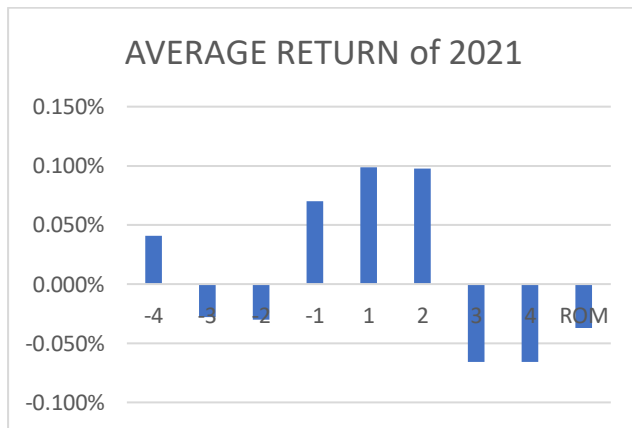


Figure 11

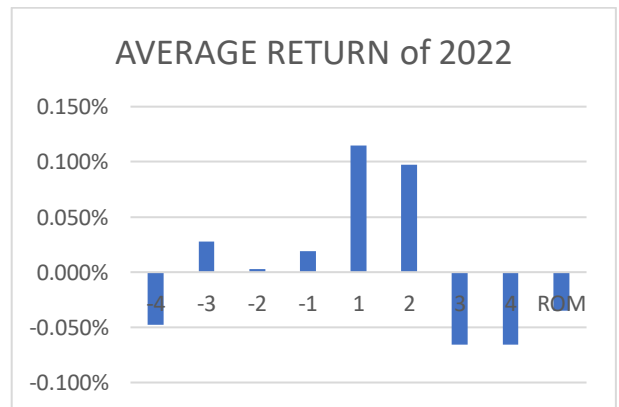


Figure 12

The Turn of the Month (TOM) effect, the well-established market anomaly, exhibits a conspicuous decline in influence during the years 2017-2022, as evident from the marginal disparity between the both returns. This trend is meticulously delineated in Figures 8, 9, 11, and 12. The diminished impact of the TOM effect during this period can be attributed to the fluctuating stock returns of the KSE-100 index, which were profoundly influenced by the political unrest and market turbulence

stemming from the economic crisis spurred by the Covid-19 pandemic. The graphical representations unequivocally substantiate the absence of the substantial uptick in KSE-100 stock returns between the year 2017 and 2022, providing the clear evidence of this anomaly effect's absence throughout the crisis period. Our analysis meticulously dissects the regular period (2011-2016) into distinct intervals, which contrast them with the crisis phase. During the regular time, this anomaly period exhibited the remarkable average return of 0.17, a figure significantly higher than the 0.04 average return for the other month, as indicated in Table 1. This substantial disparity underscores the undeniable presence of this anomaly effect during the regular time, hinting at the potential market anomalies or recurring patterns linked to the onset of each month. Conversely, the analysis of the crisis period reveals a diminished anomaly effect, with mean return values of 0.03 for the TOM period and -0.02 for the remainder month. These outcomes signify the absence of a robust anomaly effect during the crisis time, deviating from the regular market anomaly observed at the beginning of the month. Crucially, the statistical analysis corroborates these observations. The test results for both the returns, with a p-value of 0.002 from the t-tests, fails to accept the null hypothesis of no difference and supports the alternative hypothesis, affirming a significant disparity between the mean returns of the both time period across the entire dataset. This statistical evidence firmly establishes the significant difference in both the returns underscoring the presence of the TOM effect in the overall dataset.

The results of the normal Return and the crisis Return t-test presents the compelling evidence against the null hypothesis, with a p-value of 0.010. This low p-value signifies the significant disparity in mean returns for both the periods under standard market conditions, providing the robust support for the existence of the TOM effect in the regular market scenarios. In contrast, the crisis period TOM and crisis period ROM Return t-test yields the relatively high p-value of 0.25, indicating insufficient grounds to reject the null hypothesis. This higher p-value suggests that there isn't any substantial evidence to assert a notable difference in the mean returns between both the periods during market crises. Consequently, it becomes evident that the returns in the TOM period do not significantly differ from those in the remainder month period during the crisis market conditions. This lack of excess returns during the final four days of the preceding month and the first three days of the following month in the crisis period can be primarily attributed to the challenges posed by the COVID-19 outbreak and the concurrent political instability.

Table 2

Examination of T-test and Wilcoxon Rank sum Test

VARIABLE	T-test		Wilcoxon Ranksum Test	
	T-value	P-value	Z-value	P-value
TOM Return-ROM Return	3.09	0.002	1.913	0.055
Normal Return-Crisis Return	2.56	0.010	3.263	0.001
Crisis period TOM-Crisis Rom	1.12	0.25	1.802	0.071

Note: The WSR test assesses non-parametric differences between TOM and ROM periods.

The nonparametric Wilcoxon signed-rank (WSR) test, employed in our study, offered the robustness against the data distribution assumptions, making it particularly useful for comparing the paired data sets without relying on normality and variance assumptions typical in the parametric tests. In our analysis, we utilized the WSR test to assess three key groups: "TOM Return" vs. "ROM Return," "Regular Return" vs. "Crisis Return," and "Crisis Period TOM" vs. "Crisis Period ROM." For the comparison between both the returns the WSR test yielded a statistic (z) of 1.913 and a p-value of 0.0557. Although the p-value was just above the 0.05, the test results strongly rejected the null hypothesis at various significance levels (1%, 5%, and 10%), indicating a substantial difference between the two groups. Specifically, "TOM Return" exhibited a significantly higher median than "ROM Return," affirming the presence of the TOM effect. Furthermore, when comparing the "Regular Returns" and "Crisis Returns," the WSR test revealed a significant difference in median values. The test statistic (z) was 3.263, with a corresponding p-value of 0.0011, signifying the clear distinction between these groups. This outcome supports the notion that market behavior during regular periods significantly differs from that during crisis periods. Lastly, in the comparison between "Crisis TOM" and "Crisis ROM," the test statistic (z) was -1.802, yielding the p-value slightly above 0.05. Since the difference between the "Crisis TOM" and "Crisis ROM" returns was not statistically significant, we accepted the null hypothesis in this case. Consequently, these findings provide the compelling evidence that this anomaly effect vanished during the crisis period, indicating a shift in the market dynamics during the challenging economic and political times.

4.3. Regression Analysis

In our analysis, after establishing the presence of the significant anomaly effect in the indices through the mean return analysis and t-tests, we proceeded to conduct the regression analysis to further investigate this effect by comparing the mean returns for both the groups. Following the methodology employed in the prior research by Lakonishok and Smidt (1988), Kunkel et al. (2003) and others we utilized an Ordinary Least Squares (OLS) regression for our dataset. This statistical approach allowed us to delve deeper into the relationship between both returns, providing the valuable insights into the underlying dynamics of the market during the turn of the month. Following equation is shown below:

$$R_t = \alpha + \beta DTOM + \epsilon_t$$

In the regression equation utilized for our analysis, R_t represents the return on the Day t . The intercept (α) signifies the mean return for the remaining period. $DTOM$ is the binary dummy variable that represents the turn of the month period, taking the value of 1 during these days and 0 otherwise. β is the coefficient associated with the $DTOM$, representing the difference between the mean return for both the groups. The error term (ϵ_t) accounts for the residuals or an unexplained variability in the the returns on Day t . This regression framework allowed us to quantify and assess the impact of this anomaly effect on the stock returns, capturing the deviation in both the returns. With a beta coefficient of 0.129, indicates the noteworthy difference between both the returns, the statistical superiority of TOM returns is unequivocally established. Particularly, this anomaly effect manifests more prominently in the stable market conditions, as evident by the positive alpha coefficient denoting the positive returns for the remaining month. However, during the periods of crisis, the

TOM effect diminishes, reflected in the narrowed gap between both the returns, with ROM period witnessing negative returns.

Table 3

Test for TOM effect 2011-2022

Period	A	B	F test P-value	GLM P-value
Regular Period				
2011-2016				
TOM	0.041	0.129	0.000	0.001
Crisis Period				
2017-2022				
TOM	-0.020	0.050	0.630	0.001

regression coefficients (α , β) and the F-test results for the TOM effect in the table. The GLM model accounts for the variations in both month and year.

This research meticulously analyzed the anomaly pattern by employing the sophisticated three-way analysis of variance (ANOVA) model. With this method investors are able to take into account seasonal variation from both a monthly and an annual scale. Using the GLM, the researcher experimentally explored and examined how the monthly dynamics, among them the January effect and the year-end atmosphere, relates to the anomaly pattern. Following suit, the three-way GLM model helps to explain why performances vary on a monthly basis and in different years besides, which is correlated to the findings of Alford and Folks (1996) who acknowledged the effect of shifting premium of market risk on returns all through the years. The data analysis carried out by way of a GLM, where the "Period" variable stands for the two groups periods was conducted. This model is made up of two important variables "Month" and "Year" and aims to investigate what factors affect this market. Four F-tests created from the GLM results were specifically designed to test the hypotheses regarding the TOM effect and its modality effects. These F-tests assessed null hypotheses related to mean return changes over time (for both groups), months, years, and the potential interactions among these variables. By evaluating the significance of these F-tests, valuable insights were obtained regarding the existence and the significance of this anomaly effect and how it may be influenced by the temporal factors such as the months and years. The outcomes derived from the GLM model reveals minimal influence from the year and month variables on return patterns. Conversely, the hypothesis testing for the differentiation in mean returns for both groups time periods yield highly significant results (p-value = 0.001) in both the normal and crisis situations. Notably, the F-test value (1842.48) unequivocally demonstrates the substantial disparity between both the returns during regular periods, rejecting the null hypothesis. However, the F-test outcomes during the crisis period indicates a non-significant result surpassing the 0.05 threshold for the standard significance, implying the absence of a detectable anomaly effect during the crisis.

5. Discussion

The results of this study reveal intriguing insights into the Turn of the Month (TOM) effect in the Pakistani stock market, particularly highlighting how this anomaly behaves differently during the regular and crisis periods. From the year 2011 to 2016, the TOM effect is prominent, with

significantly higher returns during the anomaly days as compared to the remaining trading days. These findings are consistent with earlier studies, such as those by McConnell and Xu (2008) and Lakonishok and Smidt (1988), who documented the TOM effect in various markets which suggest that this pattern is often linked to investor behavior around month-end liquidity needs or institutional fund flows. The use of t-tests, regression analyses, and the three-way GLM model in the study highlights the robustness of the TOM effect in stable times which reinforces the idea that these anomalies may present opportunities for investors to optimize their strategies, as suggested by Haugen and Jorion (1996). However, the results during the crisis period (2017-2022) demonstrate a significant weakening of the TOM effect. The presence of negative returns around anomaly days in crisis times, along with the absence of significant returns during the TOM period, suggests that external factors such as political instability (2017-2018) and the COVID-19 pandemic may disrupt the traditional market patterns. This aligns with findings from studies like Zhu et al. (2022) and Maćkowiak (2007) which emphasize that market anomalies are sensitive to external shocks, particularly in the emerging markets. The study's non-parametric WSR test also corroborates the existence of the TOM effect during stable periods but confirms its disappearance in times of crisis which further highlights the vulnerability of market anomalies to external economic and political influences (Afshari et al., 2022). The impact of the crisis period aligns with the literature suggesting that market anomalies tend to diminish or become less predictable during periods of significant volatility (Dong et al., 2022).

5.1 Theoretical and Practical Implication

This study provides important theoretical insights into the behavior of the Turn of the Month (TOM) effect in emerging markets which highlights its sensitivity to crisis periods. The research demonstrates that while the TOM effect is robust during stable periods, external disruptions such as political instability and the COVID-19 pandemic can significantly weaken it. This finding expands anomaly theory by showing that market anomalies are context-sensitive and influenced by macroeconomic and geopolitical factors, rather than solely market mechanics. It highlights the need for adaptive theoretical frameworks that consider how external shocks can disrupt the behaviour of an investor, thus diminishing predictable patterns like the TOM effect. Furthermore, by situating the TOM effect within the Pakistani market, this study broadens the understanding of anomalies beyond the developed economies which encourages more research in diverse financial contexts.

From a practical perspective, the study's insights are invaluable for investors, fund managers, and policymakers. During stable periods, the TOM effect may present profitable trading opportunities, as evidenced by higher average returns on anomaly days, but its susceptibility to crisis suggests caution. Investors may need to reconsider anomaly-based strategies during the volatile periods when returns are unpredictable, potentially avoiding days surrounding the TOM. For policymakers, these findings highlight the importance of stabilizing political and economic conditions to support the predictability of the market. Additionally, the study encourages financial analysts to integrate crisis indicators into their anomaly-based forecasts which enhance their accuracy across varied market conditions and time periods.

5.2 Limitations and Future Direction

This study has the following limitations that merit consideration. Firstly, it primarily establishes the existence of the anomaly effect without delving into its causal factors. Future research endeavors should employ experimental methods to probe deeper into the underlying mechanisms, encompassing aspects such as investor behavior and market dynamics, to establish causation definitively. Secondly, the absence of the investigation of potential interactions with other calendar anomalies in the study limit the evaluation of the phenomenon under scrutiny. This choice limits our ability to grasp the diverse implications of the masses. That may lead to further research of the possible interdependencies of various market irregularities on the one hand, and it may also contribute to a more detailed picture of the intricate relationship of these irregularities on the other hand. To comprehend the calendar oddities better, some fields of research are proposed. Besides that, it is a fundamental task to study the causal mechanisms behind the TOM effect and other anomalies, which include factors related to such investor behavior, trading patterns, and the market microstructure dynamics. The second is to investigate how the liquidity of the market contributes to the consistency and the permanency of the price effect in different market conditions. Furthermore, by understanding the significance of the information flow and how it shapes the stock prices at the beginning of the month, one can unfold the true motives behind it. Subsequent investigations should then evaluate the generality of this effect across different financial assets as well as different geographic areas. Supportively, including the different timescales into future research initiatives can also enable getting more precise and applicable findings, which contributes to a better understanding of the calendar effects on financial markets.

6. Conclusion

This study meticulously examined this anomaly effect in the Pakistani stock market, utilizing data from the regular era (2011-2016) and the crisis time period (2017-2022). Employing the variety of statistical techniques, including the descriptive statistics, t-tests, regression analysis, a generalized linear model (GLM), a non-parametric test (WSR), and the F-tests, this research uncovered the robust TOM effect during the regular period. This effect was characterized by the significantly higher average returns on these (anomaly) days compared to the remaining days, indicating the potential trading opportunities for the investors. However, the anomaly effect substantially weakened during the crisis, with negative the returns observed on the day before and after the anomaly period, as well as remainder days. The study's graphical representations, regression analyses and three-way GLM model clearly demonstrated the absence of the TOM effect in times of market turmoil, while temporal variables such as the months and years had negligible impact on the results. Furthermore, the WSR test corroborated the existence of this effect in the regular time period, showing significantly higher turn of the month returns compared to to the remaining returns. In contrast, the study revealed the absence of this anomaly effect during the crisis, emphasizing its susceptibility to the external influences. Political upheaval in the year from 2017-2018 and the COVID-19 pandemic disrupted the regular patterns that contribute to this anomaly, underscoring the impact of the external factors on this market.

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