

COVID-19 and Seasonality in Monthly Returns: a Firm Level Analysis of PSX

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Abstract: *The current study scrutinizes the calendar anomalies in the context of the local market by analyzing the Pakistan Stock Exchange (PSX). For this purpose, closing prices of KSE-100, KSE-30 and KSE-All share Index from January, 2009 to June, 2021 have been used as well as a thorough individual firm level analysis is done, taking average log-returns of selected sample firms returns using OLS regression, general GARCH (1,1), asymmetric TGARCH and PGARCH models. The results indicate monthly seasonality, with significant April, July, and September effect in PSX indices returns. The findings of the study reveal that weak form inefficiency exists in Pakistan Stock Market, which implies the possibility of earning abnormal returns by investors using timing strategies. Due to global pandemic conditions, investor psychology investors turned circumspect. Consequently, the individual firms' trading has also reduced.*

Keywords: month-of-the-year effect; July Effect; Tax loss selling hypothesis; Pakistan stock exchange; calendar effect; July Effect; Tax loss selling

JEL Classification: G1, G14, G17, E32, E4, C58, C53

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Introduction

Generally, capital markets are considered as the dynamic equilibrium. However, an impulsive response that may occur due to financial disclosures by the firms, monetary news announcements, or psychological factors result in certain trading irregularities in the form of abnormally high or low calendar patterns; commonly known as calendar anomalies. Such observed inconsistencies are more evident in stock markets and have been analyzed in various studies (Harshita, Singh, & Yadav, 2019; Jaffe & Westerfield, 1985; Jones, Lee, & Apenbrink, 1991).

The current study aims to explore, What calendar anomalies are observed in the monthdoeseturns of the PSX indices? and Does the analysis of individual firm-level data using OLS regression, GARCH (1,1), asymmetric TGARCH, and PGARCH models reveal any patterns indicative of weak form inefficiency in the Pakistan Stock Market post/pre and during COVID-19 pandemic?

By addressing these questions, the research aims to contribute insights into the presence of calendar anomalies, market efficiency, and the effects of external factors, such as the COVID-19 pandemic, on investor behavior in the context of the Pakistan Stock Exchange.

Anomalies might emerge in indices even if they are non-existent in individual stocks making up those indices. Autocorrelation in indices is a vital factor caused by non-synchronous trading patterns in individual stocks, stimulating researchers to detect anomalies despite being absent in the individual securities (Jaffe, Keim, & Westerfield, 1989). Due to the composition of individual stocks in indices, the occurrence of an anomaly in indices, result in a more significant number than in the individual securities fabricating the index. Individual returns integrate "idiosyncratic noise" diminished once the portfolio is created. Hence, the anomaly is the consequence of systematic components (Madureira & Leal, 2001). Most of the earlier studies emphasize calendar anomalies test at the aggregate level in equity markets around the globe, but no firm-level comprehensive evidence is presented yet, except for a few focusing on banking sector stocks (Evangelos, 2017; Munir & Sook Ching, 2018) and very limited on component stocks. Thus, this study endeavors to fill this gap in the literature.

Earlier studies, in the Pakistan stock market exhibit the Gregorian as well as Islamic calendar effects using indices. We conduct a thorough and comprehensive analysis of individual stock returns to investigate calendar anomalies within the Pakistan Stock Exchange (PSX) the Pakistan Stock Exchange (PSX). In comparison to the countries worldwide, Asian countries experienced more pessimistic abnormal returns during COVID-19 pandemic and the foremost factor behind this is the investors' negative sentiment towards future returns and risk apprehensions (Liu, Manzoor, Wang, Zhang, & Manzoor, 2020). This notion substantially affected stock markets and to check this element, day-of-the week effect is tested on individual stock returns. This study explores calendar effects in the Pakistan stock market from January 2009

to June 2021 to identify the calendar effect in the context of the pandemic and before pandemic for month-of-the-year. Literature Review

Shamshir and Baig (2016) have done a thorough study to investigate month-of-the-year and turn-of-the-month anomalies using four indices in Pakistan Stock Exchange during the period 2009-2014. These anomalies were examined in particular focus of the tax-loss-selling hypothesis for July. A significant turn-of-the-month effect was observed except for the KMI-30 and KSE-30 index. Additionally, all four indices displayed significant January returns; still, no contribution to the tax-loss-selling hypothesis was ascertained. Therefore, positive sentiment towards the upcoming year and liquidity preference looks more relevant to bullish behavior in the market. However, Ali and Akbar (2009) have increased the sample period by historical data from 1991-2006 for fifteen years for the KSE index. The presence of calendar anomalies could potentially endanger an Efficient Market Hypothesis (Rossi, 2015). A detailed subsample analysis of testing monthly seasonality took June as a reference month and for daily seasonality concerning the trading days. A change in trading days of sample period occurred due to government economic regimes inferred that there were no weekday and month effects in KSE Index.

Zafar, Urooj, and Farooq (2010) further investigated the month-of-the-year effect extending just one year for 1991-2007 through dummy variables Regression. Taking January as reference month, the study found significantly negative returns just in May, which in particular advocate that trading volume continued to be truncated and consequently unfavourable yields transpired by investors relative to January. This seasonality may be explained by the fact that the Budget announcement in June forecasts a change in monetary policy and variation in general price level; likewise, with the budget declaration, investors kept on selling their stocks. Correspondingly, before budget announcement, interest rates fluctuate, signifying another cause for May seasonality. The study confirmed the month of the year effect, concluding that the Karachi stock exchange as an inefficient market monthly seasonality provides an opportunity to the investors to anticipate the prospective earnings by recognizing the prevailing stock market trend and designing strategic approaches that might facilitate in acquiring superior returns.

Iqbal, Kouser, and Azeem (2013) again utilized KSE 100 index in testing various calendar anomalies including weekday effect, end of the month effect, January effect, half month effect and Ramadan Effect. A positive half month effect was observed earlier while a negative effect was detected in the latter half month as supported by the previous studies. Although no supportive evidence was found, a positive December effect was also identified. Interestingly, there was no indication of the January effect; instead, a negative May effect was evident, probably due to the budget announcement in June. Hashmi (2014) considered merely the January effect to test the presence of the calendar anomaly in the KSE 100 index. During the sample period, the outcomes of the study showed an indication of a statistically positive January effect. Though, the identified anomaly was doubtful to contribute profitable arbitrage prospects during that time radically since abnormal returns were scaled between 1-3 per cent, which was not significant enough to compensate transactions costs.

Ullah, Ullah, and Ali (2016) selected KSE 100 index to identify the January effect in Pakistan for the period 2004-2014. The outcome of the study highlighted the January effect with positively significant returns besides the negatively significant returns in May and August. Apart from this, January showed the highest returns and the lowest returns were observed in May. The tax-loss hypothesis is considered as one of the factors explaining the lowest May returns since the budget announcement for the upcoming year is made in June. The results concluded that the presence of market anomalies confirmed that Pakistan Stock Market is weak-form inefficient. Anjum (2020) aimed specifically at these calendar anomalies investigation before and after the integration of the Pakistan Stock Exchange. The empirical investigation of weekend effect, day-of-the-week effect month-of-the-year effect (January and July effects) was done using dummy variable regression and ARCH and EGARCH-in-mean approaches. Moreover, average returns were high in December in the Karachi Stock Exchange and the Pakistan Stock Exchange; March returns were high.

Calendar Anomalies in Individual Returns

Kling and Gao (2005) investigated the monthly and daily seasonality in two Chinese stock markets using individual stock returns. For analysis, the market index of the Shanghai and Shenzhen stock exchanges and individual stock returns of all listed securities since the inception of security trading on both exchanges were utilized. Empirical findings suggested monthly seasonality in the Shanghai and the Shenzhen stock exchanges. Remarkably, February showed the highest returns, which is explained by the Chinese year-ends in February. Hence, it can be similar to the January effect for countries with the December year-end.

Marrett, George, Worthington, and Andrew (2011) scrutinized the month-of-the-year effect yet again in the Australian market using industry returns. Significantly higher January returns were detected in only two cases: the small-cap stocks and retail firms. While April, July and December showed significantly higher returns approximately three times than average returns across all months at the market-level analysis. Yat, Keong, and Ling (2011) has tangibly focused on the period after the Asian financial crisis to examine the stock market anomalies in Malaysia. Based on the GARCH (1,1) model, positive and significant January, July, October, and November returns were examined in most sectors, along with the positive Friday effect. Overall, the analysis of the seven sector indices confirmed the month-of-the-year and day-of-the-week effects with significant January and Monday effects.

Following (Jais, Jakpar, Doris, & Shaikh, 2012; Munir & Sook Ching, 2018; Narayan, Narayan, Popp, & Ali Ahmed, 2015) further investigated finance stocks in the Malaysian equity market. A detailed firm-level empirical evidence of calendar anomalies, including day-of-the-week and the month-of-the-year effect, was provided. Twenty-one finance stocks showed predictable patterns in daily seasonality, whereas monthly seasonality was observed in 19 finance stocks. The observed out-

comes of the TGARCH (threshold GARCH) model recommended asymmetric news effect and the significant daily and monthly seasonality, which is the evidence of a weak form of inefficiency, inferring those investors may be able to gain the detected abnormal returns employing timing strategies.

Singh and Das (2020) scrutinized calendar anomalies in Indian service sector indices (i.e., Banking sector and Information technology sector), and for this purpose post-recession period from 2010 to 2019 was chosen. The results showed the January effect and turn-of-the-month effect, advocating the likelihood of inefficiency in the IT sector. Wuthisatian (2021) inspected the day-of-the-week (DOW) effect and the January effect in the Thai Stock Exchange. The empirical findings showed a strong indication of seasonality with significantly negative Monday returns and positive January returns displaying the market inefficiency. Rasool, Hamid, and Hussain (2023) investigated the month-of-the-year in emerging markets of Pakistan, India and China for pre and post COVID scenarios. The results showed higher volatility in December, March and February for the countries opted in sample. Aggarwal and Jha (2023) examined the month-of-the-year effect for the six emerging Asian stock market using GARCH (1,1), EGARCH (1,1), TGARCH (1,1) models. The results indicates the persistent effect of the models in the monthly returns.

Methodology

This study exhibits the calendar anomalies in the context of the local market by analysing the Pakistan stock exchange. For this purpose, closing prices of KSE-100, KSE-30 and KSE-All share Index from January, 2009 to June, 2021 have been used as well as a thorough individual firm level analysis is done, taking average log-returns of selected sample firms returns using OLS regression, general GARCH (1,1), asymmetric TGARCH and PGARCH models to study the leverage effect of good and bad news on market volatility.

The returns calculation has been done by taking the average log returns for the selected firm's sample with the equation:

$$R_t = \log \left(\frac{P_t}{P_{t-1}} \right)$$

Where P_t represents the current period returns and represents the preceding period returns.

Ordinary Least Square Regression

The OLS regression has been conducted for the analysis of returns where the dummy coefficient signifies the average return per month which provides the month-of-the-

year effect to test the efficiency of the stock market of Pakistan. To detect the monthly effect, the regression analysis has been done by making the 12 dummy variables in order to model the independent variables:

$$R_t = \sum_{i=1}^{12} \beta_1 D_{it} + \beta_{13} R_{t-1} + \varepsilon_t$$

Where, R_t represents index return, shows the error term, D_{it} is the dummy variable that represents each month (Hussain, Hamid, Akash, Shahid, & Imdad Khan, 2011; Silva, 2010).

GARCH Model

The GARCH model analyzes the historical time series data to depict its impact on the future data which termed as the autoregressive. Bollerslev (1986) developed this idea to study the volatility in the financial market. The conditional variance in this regards specifies the volatility trends by determining the preceding values squared errors and with its lag value for GARCH model. Thus, month of the year effect can be analyzed with the estimation of GARCH specification which specifies with the equation as:

$$\sigma_t^2 = w + \sum_i^q \alpha_i \varepsilon_{t-i}^2 + \sum_j^p \beta_j \sigma_{t-i}^2 + \gamma h_{t-j}^2$$

Engle and Ng (1993) conducted Diagnostic tests to test the asymmetric response in volatility to negative shocks. The three tests are premeditated to define if a particular dataset require an asymmetric model to the residuals of a standard GARCH model with a constant in the mean equation. These tests helps in detecting the predictive power of variables which may not be part of the GARCH model. Therefore, if the squared normalized residuals are able to predict these variables, then the variance model might be mis-specified.

TGARCH (Threshold GARCH)

The threshold GARCH model is the extension of standard GARCH model which provides the asymmetric threshold effect which allows the analysis of good and bad news effect in the market.

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \gamma \varepsilon_{t-1}^2 I_{t-1}$$

γ is the asymmetric effect, I_{t-1} is the dummy variable to identify good and bad news, i.e. $I_{t-1} = 1$ if $\varepsilon_{t-1} < 0$ indicating bad news, and $I_{t-1} = 0$ if $\varepsilon_{t-1} \geq 0$ indicating good news.

PGARCH (Power GARCH)

Ding, Granger, and Engle (1993) proposed another extension for the GARCH model with the Power GARCH which models the conditional standard deviation as well as conditional variance simultaneously in the model. The PGARCH (p, q) model is specified as;

$$\sigma_t^\delta = \alpha_0 + \sum_{i=1}^q \alpha_i (|\varepsilon_{t-i} - \gamma_i \varepsilon_{t-i}|)^\delta + \sum_{i=1}^p \beta_i \sigma_{t-i}^\delta$$

Where the power term is represented by δ as parameter, such that $\delta > 0$. The standard GARCH model that captures leverage effect with $\delta=2$. On the contrary, the model used to evaluate the conditional standard deviation instead of analyzing the conditional variance only for $\delta=1$.

Results and Discussion

Sector Returns Monthly Descriptive Statistics

The sectoral descriptive statistics showed highest average return in the month of April and July. Automobile Assembler, Automobile Parts & Accessories, Leather & Tanneries, Paper & Board and Technology & Communication presented highest average returns during sample period. Interestingly, the average of monthly returns is higher till July showing the maximum trading is done in the earlier months of the year. Cable & Electrical Goods, Chemical, Fertilizer, Food & Personal Care Products, Oil & Gas Marketing Companies, Refinery, Technology & Communication showed lowest returns in August. Similarly, an inverse pattern is observed in case of lower returns with demeaning trading transactions in the later months of the year. Figure 1 shows monthly returns of all sectors in which the Tobacco sector has the highest average returns in February. Miscellaneous sector has a constant low average April, May, June and July. Overall Vanaspati and allied industries has a high average in August, September which lower down in October and resume in year-end.

A peculiar fact observed in the sample period is the highest volatility ascertained in the month of February and October while these months have not shown any significant return metrics in any of the sector. Among all sectors, Tobacco sector showed the highest volatility while Food & Personal Care has the lowest volatility. Also, average returns of July are lowest in most of the sectors. Risk and returns account for establishing the fundamentals of the investment decision process; thus, knowledge of variations regarding calendar movements with high returns can be recognized to the high volatility respectively and in the analyzed period. In many cases, financial time series possesses volatility clustering or volatility pooling which is an augmented disparity preceding high deviation, likewise low divergence following minor deviations.

Table 1: Sector Wise Monthly Descriptive Statistics

	January	February	March	April	May	June	July	August	September	October	November	December
Auto Assembler												
Statistics												
Mean	0.000973	-0.00013	6.11E-06	0.001552	0.000406	-0.00057	0.001114	-0.00081	0.000643	-0.00018	0.000631	0.000156
Std. Dev.	0.005639	0.005366	0.006657	0.006547	0.006261	0.005759	0.006118	0.007004	0.006586	0.007177	0.00684	0.005572
Min	-0.0239	-0.01712	-0.02433	-0.02171	-0.0187	-0.01892	-0.01995	-0.03041	-0.01333	-0.01961	-0.01738	-0.02062
Max	0.014934	0.014112	0.020861	0.020277	0.01928	0.016645	0.019386	0.016049	0.020237	0.021214	0.021193	0.015847
Automobile Parts & Accessories												
Mean	0.000582	-0.0016	-0.00021	0.002247	-0.00099	-5.2E-05	0.001281	-0.00027	-0.00076	-0.00051	0.001348	0.000787
Std. Dev.	0.005071	0.004663	0.0057	0.006379	0.005912	0.006028	0.005206	0.006936	0.006889	0.007139	0.006102	0.00574
Min	-0.01432	-0.01595	-0.03788	-0.01761	-0.02049	-0.02438	-0.02349	-0.02179	-0.02347	-0.02161	-0.01356	-0.01749
Max	0.014457	0.010252	0.013053	0.01817	0.015138	0.014536	0.014057	0.019988	0.019831	0.020781	0.019187	0.018089
Cable & Electrical Goods												
Mean	0.000286	-0.00151	-0.00027	0.000835	0.000349	-0.00069	0.000743	-0.00189	-6.3E-05	-0.00092	0.000339	0.001044
Std. Dev.	0.007922	0.006424	0.006951	0.007023	0.007263	0.007192	0.007114	0.008566	0.008452	0.008528	0.007174	0.007586
Min	-0.03182	-0.02017	-0.02208	-0.01916	-0.02003	-0.02232	-0.021	-0.02754	-0.02384	-0.02326	-0.02514	-0.02409
Max	0.021832	0.019766	0.023268	0.019357	0.02247	0.015307	0.020042	0.024023	0.020887	0.017262	0.016621	0.026916
Cement												
Mean	0.000861	-0.00049	0.00175	0.000424	-0.00114	3.39E-05	0.001278	-0.00136	-1.1E-05	-0.00141	0.002307	0.001298
Std. Dev.	0.006493	0.007024	0.009014	0.007173	0.007417	0.007206	0.007036	0.007973	0.00656	0.00818	0.008571	0.008164
Min	-0.02111	-0.02861	-0.0249	-0.0213	-0.0275	-0.02037	-0.01927	-0.02567	-0.01855	-0.02047	-0.01709	-0.02176
Max	0.019727	0.025149	0.045429	0.02844	0.020133	0.025851	0.021313	0.019192	0.020457	0.020964	0.032241	0.035887
Chemical												
Mean	0.001817	-0.00089	0.000322	-0.00119	-0.00118	-0.00242	-0.00114	-0.00252	-0.00094	-0.00161	-0.0009	-0.00051
Std. Dev.	0.005315	0.006043	0.018621	0.007734	0.011778	0.005114	0.005398	0.006252	0.007534	0.00551	0.006937	0.005211
Min	-0.02377	-0.01614	-0.18317	-0.08136	-0.08581	-0.01978	-0.01188	-0.02691	-0.01798	-0.01768	-0.02191	-0.01627
Max	0.013333	0.016523	0.097856	0.040255	0.091402	0.011386	0.036119	0.01015	0.043981	0.012713	0.040481	0.011132
Engineering												
Mean	-1.1E-05	-0.00096	0.000463	-0.00053	0.000177	-0.0015	0.000168	-0.00105	-0.00042	-0.00061	-9.1E-05	-0.00033
Std. Dev.	0.005433	0.009404	0.017755	0.02305	0.00545	0.005827	0.005001	0.006339	0.005814	0.006565	0.006473	0.005517
Min	-0.01974	-0.06989	-0.09495	-0.231	-0.01356	-0.02197	-0.01444	-0.01983	-0.01546	-0.02003	-0.02549	-0.02709

	January	February	March	April	May	June	July	August	September	October	November	December
Max	0.011678	0.071298	0.181947	0.228298	0.012259	0.013374	0.011611	0.017185	0.014363	0.015662	0.033116	0.013306
Fertilizer												
Mean	0.000947	0.000637	0.000731	0.000129	-0.00032	-0.00048	0.000526	-0.00079	0.000364	8.88E-05	0.000278	6.85E-05
Std. Dev.	0.006729	0.00621	0.012791	0.006478	0.005967	0.006307	0.006018	0.006627	0.00645	0.006257	0.005068	0.005535
Min	-0.02389	-0.02285	-0.06063	-0.02238	-0.01635	-0.01992	-0.02263	-0.02003	-0.01664	-0.01936	-0.01532	-0.01983
Max	0.020794	0.02162	0.090746	0.019527	0.01654	0.017341	0.027259	0.020433	0.0188	0.020558	0.01443	0.018768
Food & Personal Care Products												
Mean	0.000566	0.005108	-0.00121	-9E-05	0.000603	6.61E-06	0.000195	-0.00138	-0.00103	-0.0008	-0.00022	-0.00073
Std. Dev.	0.004084	0.022892	0.005301	0.003935	0.05296	0.004005	0.004087	0.0045	0.009204	0.005137	0.005166	0.004608
Min	-0.00817	-0.07596	-0.02793	-0.01098	-0.23274	-0.01716	-0.01542	-0.01677	-0.07835	-0.01541	-0.01428	-0.0137
Max	0.01391	0.082493	0.01013	0.013907	0.226046	0.009099	0.012415	0.009529	0.082662	0.012873	0.036735	0.009965
Glass & Ceramics												
Mean	0.000159	0.00092	0.000486	0.000863	-0.00075	-0.00059	-0.00068	-0.00057	4.51E-05	-9.5E-05	-0.0005	-0.00021
Std. Dev.	0.01031	0.009945	0.009854	0.011007	0.009424	0.011219	0.010327	0.010837	0.009365	0.010231	0.010115	0.009262
Min	-0.02968	-0.02827	-0.03182	-0.03375	-0.04102	-0.04459	-0.03086	-0.02869	-0.02374	-0.03054	-0.03175	-0.02312
Max	0.036659	0.038406	0.039985	0.05176	0.034302	0.045677	0.025212	0.047918	0.03019	0.036397	0.02983	0.026124
Leather & Tanneries												
Mean	-0.00043	-0.00248	-0.00263	0.005121	0.000718	-0.00033	0.001727	0.00297	0.001545	-0.00093	0.001602	0.000212
Std. Dev.	0.018345	0.019943	0.017173	0.016538	0.016651	0.024791	0.021538	0.012398	0.017197	0.017094	0.015732	0.019901
Min	-0.04798	-0.09473	-0.05736	-0.05218	-0.0524	-0.06437	-0.08466	-0.03057	-0.06824	-0.07756	-0.05637	-0.06912
Max	0.075385	0.080545	0.050575	0.069351	0.051228	0.065975	0.089233	0.033686	0.080953	0.045131	0.09998	0.075042
Miscellaneous												
Mean	0.000339	-0.00272	-0.00442	-0.01157	-0.01602	-0.01773	-0.015	0.004484	0.001775	-0.00214	0.001966	-5.9E-05
Std. Dev.	0.008623	0.007438	0.03518	0.044761	0.048594	0.050868	0.048312	0.034363	0.007562	0.008492	0.008285	0.006629
Min	-0.04461	-0.03147	-0.17434	-0.17591	-0.18037	-0.17123	-0.17916	-0.1608	-0.01754	-0.02109	-0.0179	-0.02078
Max	0.040069	0.019174	0.36414	0.052931	0.01989	0.019079	0.021434	0.199413	0.029101	0.021293	0.051697	0.020587
Oil & Gas Exploration Companies												
Mean	0.00017	-9.4E-05	0.000742	0.000834	0.000899	-0.00038	0.000864	-0.00024	-0.0001	1.17E-06	0.000409	0.000173
Std. Dev.	0.006831	0.005817	0.006304	0.005693	0.005853	0.005913	0.005547	0.006614	0.005943	0.008174	0.005786	0.005794
Min	-0.02225	-0.02195	-0.01661	-0.02015	-0.01454	-0.02071	-0.02221	-0.02226	-0.02783	-0.07397	-0.01753	-0.02226

	January	February	March	April	May	June	July	August	September	October	November	December
Max	0.021747	0.022719	0.023526	0.020657	0.017462	0.017774	0.015694	0.018523	0.017402	0.020343	0.017764	0.02019
Oil & Gas Marketing Companies												
Mean	0.000415	-0.00046	0.001181	0.00031	0.000297	-0.00053	0.000998	-0.00116	0.00037	-0.00024	0.000413	-0.00023
Std. Dev.	0.005962	0.005855	0.006047	0.005641	0.005396	0.005768	0.005554	0.006525	0.005884	0.006937	0.005708	0.005674
Min	-0.02005	-0.02287	-0.02067	-0.01816	-0.01954	-0.02143	-0.02161	-0.02227	-0.01632	-0.01816	-0.01565	-0.02365
Max	0.023031	0.018495	0.023058	0.013947	0.01493	0.015015	0.015501	0.018398	0.017749	0.019205	0.031768	0.015986
Paper & Board												
Mean	0.00093	-0.00235	0.000514	0.00141	0.000288	-0.00099	0.001366	-0.00121	6.53E-05	-0.00013	0.000385	0.001277
Std. Dev.	0.006297	0.005991	0.005675	0.006035	0.006072	0.005841	0.005667	0.006844	0.005501	0.00674	0.005051	0.005149
Min	-0.01625	-0.01619	-0.01749	-0.01455	-0.01687	-0.0185	-0.02225	-0.02476	-0.01735	-0.02614	-0.01386	-0.01464
Max	0.016484	0.015837	0.01864	0.025239	0.020229	0.015733	0.01952	0.014921	0.013069	0.018693	0.017455	0.013116
Pharmaceuticals												
Mean	0.000118	-0.00165	-0.00033	0.000702	2.07E-05	2.43E-05	0.001166	-0.00072	0.000591	9.03E-05	0.000883	0.000245
Std. Dev.	0.005373	0.023348	0.006004	0.004717	0.004974	0.005711	0.005277	0.006251	0.006028	0.008563	0.005245	0.00605
Min	-0.01752	-0.15317	-0.0212	-0.01087	-0.01647	-0.01801	-0.01922	-0.02223	-0.01462	-0.05611	-0.01541	-0.0186
Max	0.01496	0.148713	0.016086	0.016132	0.016343	0.01661	0.016684	0.017619	0.019923	0.05916	0.018968	0.020263
Power Generation & Distribution												
Mean	0.00196	0.000471	-0.00302	0.001894	-2.9E-05	-0.00071	0.000346	-0.00011	-0.00191	-0.00154	0.002807	0.001292
Std. Dev.	0.00872	0.013386	0.009255	0.007242	0.007843	0.006935	0.006292	0.007636	0.007902	0.006781	0.011846	0.008128
Min	-0.02391	-0.09122	-0.03762	-0.01386	-0.03122	-0.01973	-0.01976	-0.02814	-0.03617	-0.01744	-0.01926	-0.01778
Max	0.031451	0.090087	0.025269	0.036016	0.051553	0.019285	0.020392	0.024885	0.021304	0.023309	0.074722	0.032335
Refinery												
Mean	0.000552	-0.00103	0.001936	0.001282	-0.00018	-2.2E-05	0.001528	-0.00185	-0.00041	-0.00037	0.000422	-0.00032
Std. Dev.	0.009058	0.007225	0.008285	0.007873	0.007401	0.007947	0.007052	0.008034	0.007418	0.009131	0.007105	0.007068
Min	-0.03066	-0.03204	-0.0232	-0.02683	-0.02432	-0.02338	-0.0227	-0.02963	-0.0202	-0.02839	-0.01993	-0.02478
Max	0.032646	0.023333	0.034712	0.030794	0.018599	0.022698	0.021134	0.019795	0.020549	0.028235	0.023301	0.021987
Sugar & Allied Industries												
Mean	-0.00063	-0.00052	-0.00112	-0.00096	-0.00098	-0.00184	0.001663	-0.00024	-0.00017	-0.00099	0.000489	-0.00061
Std. Dev.	0.006787	0.007463	0.009622	0.007995	0.006073	0.007091	0.008832	0.005918	0.005949	0.005928	0.007184	0.005201
Min	-0.02078	-0.01753	-0.07349	-0.05925	-0.02498	-0.01692	-0.0173	-0.01729	-0.0172	-0.01551	-0.01676	-0.01506

	January	February	March	April	May	June	July	August	September	October	November	December
Max	0.027866	0.024999	0.06349	0.02416	0.013384	0.027134	0.038587	0.013579	0.013839	0.01146	0.0561	0.020108
Synthetic & Rayon												
Mean	0.00297	0.00738	0.000279	0.001682	0.004133	-0.00266	-0.00382	-0.00109	-0.00089	-0.00141	0.002117	0.001788
Std. Dev.	0.012317	0.050866	0.013161	0.014662	0.016428	0.015843	0.019547	0.014957	0.013521	0.013738	0.014943	0.012271
Min	-0.06537	-0.16822	-0.04396	-0.05741	-0.05246	-0.06464	-0.07015	-0.06298	-0.05712	-0.04427	-0.05621	-0.07459
Max	0.042672	0.207504	0.057772	0.062399	0.061482	0.062919	0.066217	0.062014	0.047029	0.05967	0.049885	0.042772
Technology & Communication												
Mean	0.000517	-0.0003	0.000196	0.001149	0.000199	-0.00065	0.000558	-0.00078	0.000847	0.00026	0.00026	0.000335
Std. Dev.	0.007695	0.00704	0.007951	0.007207	0.007863	0.007861	0.00689	0.008025	0.008323	0.007464	0.007464	0.007724
Min	-0.02628	-0.01764	-0.02184	-0.01333	-0.02045	-0.02355	-0.03078	-0.03562	-0.02876	-0.0223	-0.0223	-0.02089
Max	0.03141	0.019994	0.024467	0.024934	0.030769	0.025022	0.029723	0.019004	0.027116	0.024134	0.024134	0.03833
Textile Composite												
Mean	0.00188	-0.00288	-0.00055	0.001401	0.000635	0.001734	0.002727	0.001166	0.001932	-0.00027	0.001399	0.001537
Std. Dev.	0.005866	0.015365	0.005737	0.005603	0.005528	0.006526	0.006014	0.005674	0.005731	0.005463	0.006957	0.005722
Min	-0.01671	-0.07256	-0.03162	-0.02268	-0.0177	-0.02515	-0.01325	-0.01951	-0.01475	-0.01986	-0.01927	-0.013
Max	0.017377	0.074541	0.017009	0.014012	0.017845	0.024569	0.022878	0.016681	0.018784	0.016998	0.039371	0.019052
Textile Spinning												
Mean	0.000832	-0.00611	-0.00294	-0.00129	-0.00313	-0.00667	0.000707	-0.00091	0.002216	-0.00063	0.000431	-0.00018
Std. Dev.	0.008375	0.020156	0.007502	0.006512	0.00765	0.011032	0.008477	0.010149	0.009079	0.009557	0.010238	0.008853
Min	-0.02673	-0.12132	-0.02592	-0.02115	-0.03007	-0.05032	-0.02717	-0.02724	-0.03534	-0.02202	-0.03541	-0.02612
Max	0.023417	0.023629	0.02917	0.024158	0.020058	0.013423	0.029817	0.036109	0.031228	0.038405	0.036488	0.034944
Textile Weaving												
Mean	0.001371	-0.00064	0.00238	0.001157	-0.00041	0.001748	0.000826	-0.00147	0.005175	-0.00153	0.001553	0.001585
Std. Dev.	0.012189	0.012604	0.012817	0.013656	0.010933	0.013382	0.013983	0.013172	0.014709	0.016041	0.013731	0.015321
Min	-0.03971	-0.04012	-0.02922	-0.04031	-0.04749	-0.03775	-0.03976	-0.04234	-0.03139	-0.06909	-0.03048	-0.03465
Max	0.031949	0.043806	0.049796	0.040652	0.033144	0.046558	0.052385	0.031845	0.066283	0.049806	0.056441	0.0532
Tobacco												
Mean	0.003642	0.03355	0.002798	0.003639	7.55E-05	-0.00112	0.000806	0.00123	0.001768	0.002518	0.000341	0.001571
Std. Dev.	0.01775	0.145727	0.011067	0.010014	0.008252	0.007504	0.006238	0.007898	0.006804	0.007178	0.007182	0.010189
Min	-0.04829	-0.51673	-0.02114	-0.02409	-0.01977	-0.02313	-0.01942	-0.02733	-0.01311	-0.01594	-0.01985	-0.01578

	January	February	March	April	May	June	July	August	September	October	November	December
Max	0.059874	0.519356	0.030209	0.027377	0.019955	0.019253	0.021122	0.019849	0.02095	0.017516	0.018648	0.104873
Transport												
Mean	0.000066	-0.00138	0.000589	0.000179	-4.6E-05	-0.00105	0.001214	-0.00061	0.00045	0.000301	0.000972	0.000497
Std. Dev.	0.009357	0.009565	0.007887	0.007567	0.007761	0.007567	0.007574	0.008807	0.009602	0.009009	0.007261	0.008041
Min	-0.02224	-0.02195	-0.02072	-0.02155	-0.01935	-0.01953	-0.02219	-0.02227	-0.04012	-0.02206	-0.01542	-0.02018
Max	0.025563	0.021921	0.021141	0.021042	0.021127	0.020816	0.021179	0.021157	0.051511	0.021186	0.021084	0.021165
Vanaspati & Allied Industries												
Mean	0.015468	0.007164	0.009676	0.007221	-0.0008	-0.00029	0.005795	0.020544	0.020765	0.01386	0.01568	0.012754
Std. Dev.	0.036419	0.020842	0.014564	0.021779	0.030716	0.025816	0.024021	0.04021	0.046524	0.038596	0.043627	0.044404
Min	-0.0427	-0.0663	-0.02075	-0.08359	-0.0856	-0.08745	-0.06335	-0.02319	-0.02799	-0.03444	-0.04698	-0.04377
Max	0.142416	0.078213	0.043009	0.062699	0.069672	0.041927	0.123676	0.124744	0.160648	0.133076	0.176312	0.155944
Woolen												
Mean	0.000944	0.000426	-0.00239	-0.00123	0.000129	-0.00088	0.001272	-0.00107	-0.00011	-0.00127	0.000855	0.000835
Std. Dev.	0.010756	0.01094	0.013878	0.012935	0.012518	0.011688	0.011876	0.012563	0.01406	0.017439	0.012545	0.011061
Min	-0.02221	-0.03218	-0.06667	-0.03441	-0.03812	-0.03614	-0.04286	-0.04286	-0.05436	-0.15371	-0.04604	-0.02968
Max	0.030924	0.023323	0.033488	0.021823	0.037207	0.034282	0.022337	0.030742	0.051795	0.039689	0.035185	0.032669

Month of the year Effect Analysis

A total of 45 (18%) firms have not shown monthly seasonality during the COVID period, while 39 firms (15%) were efficient in the whole sample. Thus, just 6% of firms are found to be efficient in 2019. Later, statistics presented after analyzing all GARCH Models most of the market inefficiency is marked during the pre-COVID period. All three KSE indices have shown March negative and April positive effects, except for the KSE-All share index in the COVID period; a similar seasonality pattern is observed in individual stock during this period, with 44% of firms having April effect. In the same way, the entire sample of 10 years showed 31% firms with this effect, and again the highest 47% of firms showed this seasonality during the pre-COVID period.

July effect is quite apparent and significant in the case of (54%) 136 individual firms during 2019, 81 (32%) firms in 2020, whereas in the entire sample, just (29%) 76 firms detected the July effect. However, at the index level, it is solely identified in the pre-COVID period; no sign of this effect is identified in the COVID period. Moreover, even though the KSE-30 index has detected this effect in the entire sample, KSE-100 showed market efficiency whilst KSE-All share has no July effect. April was the second identified effect that was prominent in individual firms analyses. 31% firms showed significant April in the whole sample of 10 years while 47% firms in 2019 whereas 44% firm have April seasonality in COVID period. 31% of firms have detected January seasonality in the entire sample, and interestingly 46% was spotted in 2019, and a little less than 28% have revealed the January effect in the COVID period.

Around February, September and December, the weak form of monthly anomalies is detected in various sectors. KSE-100 has not shown any seasonality; KSE-All share index depicted negative May and June effect; while a deviating seasonality pattern is observed in individual stock during this period.

Further looking into the results, 31% of firms have detected January seasonality in the entire sample. April was the second identified effect that was prominent in individual firms analyses. As 31% firms showed significant April in the whole sample of 10 years. Likewise, July effect is quite apparent and significant in the case of (29%) 76 firms. However, at the index level, it is solely identified in the KSE-30 index. Moreover, even though the KSE-30 index has detected this effect in the entire sample, KSE-100 showed market efficiency whilst KSE-All share has no July effect. Around February, September and December, the weak form of monthly anomalies is detected in various sectors. Moreover, the outcomes of the models endorse the assertion of higher returns among the stocks from January through July, since 85% coefficients are significantly positive and statistically significant at 5% level and nearly one sixth of all the observed stock returns generated significant results at 1% level. During the period, August to December the output of the data implied that stock returns are 4.9% greater than the rest of the year.

Table 2: Summary of Results of Month of the year Effect (All Models, Regression, GARCH, TGARCH, PGARCH)

No	Month of the Year Effect					
	Complete Data Set		2019		During COVID 2020	
	Months	Returns	Months	Returns	Months	Returns
Auto Assembler Companies						
1	KSE 30	July	May, June, July, August	July, August	March, April	July, August
2	KSE 100	July	May, June, July, August	July, August	March, April	July, August
3	KSE ALL Share	May, June	May, June, July, August	July, August	March, April	July, August
1	Al-Ghazi Tractors Ltd. ALGH	July	June, Aug	July, Aug	Feb, May, Aug	July, August
2	Atlas Honda Ltd. ATHO	June	May, Nov	May, Nov	Jan, April, Nov	July, August
3	Dewan Farooqui Motors Ltd. DEFM	Feb, Aug, Oct	May, Nov	May, Nov	Jan, April, July, Nov, Dec	July, August, September
4	Ghandara Nissan Ltd. GHNL	No Effect	March, July	March, July	March	July
5	Ghandhara Industries Ltd. GHIN	July, August	Jan, June, July	July	April, July, Dec	July, August, September
6	Ghani Automobile Industries Ltd. GAIL	Oct	Nov	Nov	Jan, April, May	July, August, September
7	HinoPak Motors Ltd. HINO	March, Aug	March, May, June, Nov	Nov	Jan, July, Dec	July, August, September
8	Honda Atlas Cars (Pak.) Ltd. HAATC	April	July, Aug, Nov	July, Aug, Nov	April, July, Oct	July, August
9	Indus Motor Co. Ltd. INDU	April, June, Aug	Nov, Oct	Nov, Oct	April, July	July, August
10	Millat Tractors Ltd. MILM	No Effect	Nov	Nov	April, March	July, August
11	Pak Suzuki Motor Co. Ltd. PKSU	April, Aug	Nov	Nov	April	July, August
12	Sazgar Engineering Works Ltd. SAZG	No Effect	Jan, March, Aug	Aug	March, May, Oct	July, August
Auto Parts Companies						
1	Atlas Battery Ltd. ATLA	Jan, April, July, Dec	June, Nov	Nov	April, Oct	July, August
2	Baluchistan Wheels Ltd. BWHL	Jan, April, July, Dec	Jan, April, July, Aug, Dec	Aug, Dec	Jan, April, May, July, Dec	July, August, September
3	Exide Pak. Ltd. EXID	No Effect	Jan, April, July, Sep	July, Sep	April	July, August
4	General Tyre & Rubber Co. Pak. GNTY	April	Jan, April, July, Sep	July, Sep	April	July, August
Cable & Electrical Goods						
1	Johnson and Phillips (Pak.) Ltd. JHPH	Nov	Jan, June, July, Dec	July, Dec	Jan, April, June, July, Dec	July, August, September
2	Pak Elektron Ltd. PKEK	March, April, July, Dec	Feb, April, June, July	July	July	July, August
3	Pak. Cables Ltd. PKBC	Jan, Feb, June, Oct	Jan, April, June, Nov	Nov	March	July, August
4	Siemens Pak Engineering Co. Ltd SIEG	Jan, April, June, Oct, Dec	Jan, April, July, Aug, Dec	Aug, Dec	Jan, March	July, August
5	Waves Singer Pak. Ltd. WAVES	Dec	Nov	Nov	April, July	July, August

Month of the Year Effect									
No	Complete Data Set	2019			During COVID 2020				
		Returns	Months	Returns	Returns	Months	Returns		
Cement Companies									
1	Attock Cement (Pak.) Ltd. ATOC	+,+	March, July	+,+,+,+,+	April, Dec	+,+,+,+,+	April	+,	No Effect
2	Bestway Cement Ltd. BEST	+,+,+,+	Feb, July, Nov	+,	Nov	+,	April, July	+,+	No Effect
3	Cherat Cement Co. Ltd. CHRC	+,+,+	Jan, March, July	+,+,+,+	April, May, June, Nov	+,	April, July	+,+	No Effect
4	D.G. Khan Cement Co. Ltd. DGKH	+,+,+,+,+	Jan, Mar, July, Dec	+,+,+,+,+	May, Aug	+,	April	+,	No Effect
5	Dandot Cement Co. Ltd. DANC	+,+,+,+	Feb, June, Oct	+,+,+,+,+	April, July, Oct, Nov, Dec	+,+,+,+,+	Jan, April, July, Aug, Nov	+,+,+,+,+	No Effect
6	Dewan Cement Ltd. DECD	+,+	Feb, June	+,	June	No Effect	March, July	+,+	No Effect
7	Fauji Cement Co. Ltd. FAUC	+,+,+,+	Jan, July, March	+,	Jan, March, April, Nov	+,+,+,+,+	March, July	+,+	No Effect
8	Fecto Cement Ltd. FCEM	+,+	Jan, July	No Effect	March, April, July, Sep	+,+,+,+,+	Feb, March, April, July, Dec	+,+,+,+,+	No Effect
9	Flying Cement Co. Ltd. FYCC	+,+,+,+,+	Jan, April, July, Dec	+,+,+,+,+	Nov	+,	Feb, March, April, Sep	+,+,+,+,+	No Effect
10	Gharibwal Cement Ltd. GHAR	+,+,+,+,+	Feb, Oct	+,+,+,+,+	Feb, March, July, Dec	+,+,+,+,+	Feb, March, April, Sep	+,+,+,+,+	No Effect
11	Javedan Corporation Ltd. JAVA	+,	March	+,	May	+,	April	+,	No Effect
12	Kohat Cement Ltd. KOHC	+,	March	+,	Aug	+,	April, July	+,+	No Effect
13	Lucky Cement Ltd. LUKC	+,+,+,+	Jan, Mar, July, Nov	+,+,+,+	Aug, Nov	+,+	April	+,	No Effect
14	Maple Leaf Cement Factory Ltd. MPLF	No Effect	March	No Effect	May, Nov	+,+	April	+,	No Effect
15	Pioneer Cement Ltd. PION	+,	March	+,	May	No Effect	Jan, April, July, Nov, Dec	+,	No Effect
16	Power Cement Co. Ltd. POWER	+,	March	+,	May	No Effect	Jan, April, July, Nov, Dec	+,	No Effect
17	Thatta Cement Co. Ltd. THAT	+,+,+,+,+	Jan, April, July, Aug, Oct	+,+,+,+,+	May	+,	Jan, April, July, Nov, Dec	+,+,+,+,+	No Effect
Chemical									
1	Archroma Pak. Ltd. ARCH	+,	March	+,	June, Dec	+,	Jan, July	+,	No Effect
2	Berger Paints Pak. Ltd. BERG	+,	Aug	+,	Jan, April, July, Aug, Dec	+,+,+,+,+	Jan, July	+,+	No Effect
3	Biafo Industries Ltd. BFIN	+,+,+,+,+	Jan, March, Aug, Nov	+,	April, July	+,	Feb, March, May, June, Nov	+,+,+,+,+	No Effect
4	Buxly Paints Ltd. BUXL	+,+,+,+,+	Jan, July, Aug, Nov, Dec	+,	Jan, March, May	+,+,+	Jan, April, May, Aug, Oct	+,+,+,+,+,+	No Effect
5	Colgate Palmolive (Pak.) Ltd. COLG	+,+,+,+	June, Nov, Dec	+,	Jan, April, June, July, Nov	+,+,+,+,+	Jan, April, June, July, Dec	+,+,+,+,+,+	No Effect
6	Data Agro Ltd. DAGL	No Effect	Jan, April, July, Dec	No Effect	Jan, April, July, Nov, Dec	+,+,+,+,+	Jan, April, June, July, Dec	+,+,+,+,+,+	No Effect
7	Descon Oxychem Ltd. DOL	No Effect	Jan, April	No Effect	May	+,	March, Oct	+,	No Effect
8	Dyneca Pak. Ltd. DYNE	+,+	Jan, April	+,+	Mar, April, June, July, Dec	+,+,+,+,+	Jan, June	+,+	No Effect
9	Engro Polymer Chemicals Ltd. EPCL	No Effect	Jan, April	No Effect	April, May, August	+,+,+	Jan, June	+,	No Effect

Month of the Year Effect						
No	Complete Data Set		2019		During COVID 2020	
	Months	Returns	Months	Returns	Months	Returns
10	I.Co.1 Pak. Ltd. ICI	Feb, July, Aug	Jan, Mar, July, Aug, Nov	Jan, Mar, July, Aug, Nov	April, May	April, May
11	Itehad Chemical Ltd. ITHD	Jan, April, July, Aug, Dec	Feb, Nov	Feb, Nov	April, Dec	April, Dec
12	Leiner Pak Gelatine Ltd. LEGL	Jan, April, May, Nov, Dec	Low Sample Data	Low Sample Data	July	July
13	Lotte Chemical Pak. Ltd. LOTT	Jan	Jan, April, July, Nov, Dec	Jan, April, July, Nov, Dec	Jan, April, May, June, Aug	Jan, April, May, June, Aug
14	Nimir Industrial Chemicals Ltd. NIIN	Feb, Oct	Jan, Mar, April, July, Dec	Jan, Mar, April, July, Dec	Low Sample Data	Low Sample Data
15	Pak. Gum and Chemicals Ltd PKGC	July	Feb, June, July, Aug, Dec	Feb, June, July, Aug, Dec	March	March
16	Pak. Oxygen Ltd. PAKOXY	Feb	April, June, Dec	April, June, Dec	March, April, May, July	March, April, May, July
17	Sardar Chemical Industries Ltd. SCHI	Jan, April, June, July, Aug	Low Sample Data	Low Sample Data	Jan, April, June, July, Dec	Jan, April, June, July, Dec
18	Sitara Chemical Industries Ltd. SITC	Feb	Jan, Mar, April, July, Dec	Jan, Mar, April, July, Dec	Jan, April, June, July, Dec	Jan, April, June, July, Dec
19	Sitara Peroxide Ltd. SPL	April, July	Low Sample Data	Low Sample Data	Jan, April, June, July, Dec	Jan, April, June, July, Dec
20	Wah Nobel Chemicals Ltd. WAHN	Feb, May, Nov	Jan, April, July, Aug, Dec	Jan, April, July, Aug, Dec	Jan, April, July, Aug, Dec	Jan, April, July, Aug, Dec
		No Effect	Jan, April, July, Nov, Dec	Jan, April, July, Nov, Dec	July, May, Nov	July, May, Nov
3	Crescent Steel Products Ltd. CRST	Jan, July	March, May, Aug	March, May, Aug	August	August
4	Dadex Eternit Ltd. DAET	Feb, April	Jan, April, July, Aug, Dec	Jan, April, July, Aug, Dec	Jan, May, June, July, Nov	Jan, May, June, July, Nov
5	Huffaz Seamless Pipes Ltd. HUFF	Feb	Low Sample Data	Low Sample Data		
6	International Industries Ltd. INTI	Jan, April, Oct	May, July	May, July		
7	K.S.B. Pumps Co. Ltd. KSBP	May, July	Feb, April, July, Nov, Dec	Feb, April, July, Nov, Dec	Jan, April, June, July, Dec	Jan, April, June, July, Dec
8	Pak. Engineering Co. Ltd. PKEG	Jan, Feb, Aug, Nov	Low Sample Data	Low Sample Data		
		No Effect	Jan, April, July, Aug, Dec	Jan, April, July, Aug, Dec	Jan, Feb, April, July, Sep	Jan, Feb, April, July, Sep
1	Arif Habib Corporation Ltd. ARIF	Feb, March, Oct	April, May	April, May	March	March
2	Dawood Hercules Corp. Ltd. DAWH	Jan, June	May, June, July, Aug, Dec	May, June, July, Aug, Dec	April	April
3	Engro Corporation Ltd. EGCH	Jan			No Effect	No Effect
4	Fauji Fertilizer Bin Qasim Ltd. JORD	Jan			No Effect	No Effect
5	Fauji Fertilizer Co. Ltd. FAUF	Jan			No Effect	No Effect
		No Effect	May, July, Aug, Nov	May, July, Aug, Nov	March	March
1	Clower Pak. Ltd. CLVF	Feb, March, Aug, Dec				

Engineering

Fertilizer

Food & Personal Care

Month of the Year Effect						
No	Complete Data Set		2019		During COVID 2020	
	Months	Returns	Months	Returns	Months	Returns
2	Fauji Foods Ltd. FAUJ	Feb, May, Aug, Nov + + + + + +	April, May, July			No Effect
3	Gillette Pak. Ltd. GILT	July, Aug, Dec + + + + +	Jan, April, July, Dec		Jan, April, July, Aug, Dec	
4	Ismail Industries Ltd. ISML	Jan, Aug, Nov + + + + + +	Low Sample Data			
5	Mitchells Fruit Farms Ltd. MITF	Feb, Oct + +	Jan, April, July, Nov, Dec		Jan, May, June, July, Dec	
6	Murree Brewery Co. Ltd. MUBR	No Effect	Jan, Feb, April, July, Dec		Jan, March, April, July, Nov	
7	National Foods Ltd. NATF	Oct +	Feb, June, July, Aug, Dec		Feb, March	
8	Nestle Pak. Ltd. MLKP	June +	July, Aug		Jan, April, July, Aug, Dec	
9	Rafhan Maize Products Ltd. RAMZ	June, July, Dec + + + +	Jan, April, May, Nov, Dec		Jan, April, July, Aug, Dec	
10	Shezan International Ltd. SHEZ	Feb, March + +	Jan, April, July, Nov, Dec		Jan, April, July, Aug, Nov	
11	Shield Corporation Ltd. SCL	Jan, April, July, Aug, Dec + + + + + +	Jan, April, May, Nov, Dec		Feb, March, April, July, Dec	
12	Treet Corporation Ltd. TRET	Jan, Ma, April, July, Dec + + + + + +	July			No Effect
13	Unilever Pak. Foods Ltd. UPFL	No Effect	Jan, April, May, July, Dec		Jan, May, June, July, Oct	
14	ZIL Ltd.	Aug, Nov + +	Feb, March, April, Nov			No Effect
Glass & Ceramics						
1	Balochistan Glass Ltd. BGLS	June +	May, Aug, Nov, Dec		March, May	
2	Emco Industries Ltd. EMCO	No Effect	Low Sample Data			
3	Frontier Ceramics Ltd. FRCE	Aug, Nov + +	Jan, April, May, June, July, Nov, Dec		Nov	
4	Ghani Glass Ltd. GHGL	No Effect	Feb, May, July, Dec			No Effect
5	Ghani Value Glass Ltd. GVGL	April, May, June, July, + + + + + +	Jan, April, July, Nov,			No Effect
6	Karam Ceramics Ltd. KARA	Feb, May, June, July, Dec + + + + + +	Low Sample Data		Low Sample Data	
7	Shabbir Tiles and Ceramics Ltd. SHAB	Feb +				No Effect
8	Tariq Glass Industries Ltd. TAGS	Months No Effect	July, Nov		April	
	Leather & Tannaries	Returns + +	Months		Months	Returns
1	Bata Pak. Ltd. BATA	April, May + +	Aug			No Effect
2	Leather Up Industries Ltd.	March +	Jan, May, Nov		March	No Effect
3	Service Industries Ltd. SVCI	Feb, May + +				

Month of the Year Effect						
No	Complete Data Set	2019		During COVID 2020		
		Returns	Months	Returns	Months	
Miscellaneous						
1	Al-Khair Gadoon Ltd. AKGL	March, May, Nov	Low Sample Data	March, April, Aug, Nov, Dec	March, April, Aug, Nov, Dec	+,+,+,+,+,+,+
2	Ecopack Ltd. ECOP	No Effect	Feb, May, Dec	+,+,+,+	March, April, Aug, Nov, Dec	+,+,+,+,+,+,+
3	GOC (Pak) Ltd., GOCL	+,+,+,+,+	Low Sample Data	+,+,+,+,+,+,+	Jan, Mar, July, Nov, Dec	+,+,+,+,+,+,+
4	Gammon Pak. Ltd. GAMN	+,+,+,+	Jan, April, July, Aug, Dec	+,+,+,+,+,+,+	Jan, Mar, July, Nov, Dec	+,+,+,+,+,+,+
5	Macpac Films Ltd. MACP	+	Jan, April, July, Nov, Dec	+,+,+,+,+,+,+	May, June, Aug	+,+,+,+
6	Pak. Hotels Developers Ltd. PHTD	+,+,+,+,+,+,+	Feb, Mar, April, July, Dec	+,+,+,+,+,+,+	Jan, April, July, Nov, Dec	+,+,+,+,+,+,+,+,+
7	Pak. Services Ltd. PKSV	+,+,+,+,+,+,+	Low Sample Data	+,+,+,+,+,+,+		
8	Shifa International Hospitals Ltd. SIHL	+,+	Jan, April, July, Aug, Nov	+,+,+,+,+,+,+	April	+,+
9	Siddiqsons Tin Plate Ltd. STPL	+,+	May, June	+,+,+	December	+,+
10	Tri-Pack Films Ltd. TPFL	No Effect		No Effect	March, April	+,+
11	United Brands Ltd. UDLI	+,+,+,+,+,+,+	Jan, April, July, Aug, Dec	+,+,+,+,+	Jan, Feb, Oct	+,+,+,+
12	United Distributors Pak. Ltd. UTDS	+,+,+,+,+,+	Jan, Mar, April, July, Dec	+,+,+,+,+,+,+	March, May, Nov	+,+,+,+
13	AKD Capital Ltd.	+,+,+,+,+,+,+	Jan, April, July, Aug, Dec	+,+,+,+,+,+,+		No Effect
Oil & Gas Exploration						
1	Oil and Gas Development Ltd. OGDCL	No Effect	Mar, April, July, Aug, Nov	+,+,+,+,+,+,+	May	+,+
2	Mari Petroleum Co. Ltd. MARI	+,+	May, August	+,+	May	+,+
3	Pak. Oilfields Ltd. POL	No Effect	Jan, April, July, Aug, Dec	+,+,+,+,+,+,+	April, May, Sep	+,+,+,+
4	Pak. Petroleum Ltd. PPL	No Effect	Aug	+	April, November	+,+,+
Oil & Gas Marketing						
1	Attock Petroleum Ltd. APL	+,+,+,+,+	Jan, April, July, Oct	+,+,+,+,+	March, April, May, Aug	No Effect
2	Burshane LPG (Pak.) Ltd.	+	Aug	+,+,+,+,+,+,+	Jan, June, July, Nov, Dec	+,+
3	Pak. State Oil Co. Ltd. PSO	+,+	Nov	+,+,+,+,+,+,+	Feb, March, April	+,+,+
4	Shell Pak. Ltd. SHEL	+,+,+	March, Aug, Oct	+,+,+,+,+,+,+	Jan, April, May, July, Sep	No Effect
5	Sui Northern Gas Pipelines Ltd. SUIN	+	Aug	+,+,+,+,+	April, July, Aug, Sep	No Effect
6	Sui Southern Gas Co. Ltd., SUIJS	+,+,+,+,+,+,+	April, June, Aug, Dec	+,+,+,+,+	April, May, July, Aug	No Effect
Paper & Board						
1	Century Paper & Board Ltd. CENP	No Effect	June, July, Nov	+,+,+		No Effect

Month of the Year Effect							
No	Complete Data Set			2019		During COVID 2020	
	Months	Returns	Months	Returns	Months		
2	Cherat Packaging Ltd. CHPR	April, Nov	+,+	April, May, July, Nov	+,+,+,+	Aug	+,
3	Merit Packaging Ltd. MERIT	Feb, April, June, Nov	+,+,+,+,+	Jan, April, June, Aug, Nov	+,+,+,+,+	May	+,
4	Packages Ltd. PACK	Jan	+	April, May	+,+	March	-
5	Pak. Paper products Ltd. PPP	Jan, Feb, April, June, Nov	+,+,+,+,+,+	Jan, Feb, April, July, Nov	+,+,+,+,+,+	Jan, April, May, July, Sep	+,+,+,+,+,+,+
6	Security Paper Ltd. SCPR	April, July, Aug	+,+,+	Feb, April, Aug, Nov, Dec	+,+,+,+,+,+	Feb, April, Aug, Nov	+,+,+,+,+,+
Pharmaceutical							
1	Abbot Laboratories (Pak.) Ltd. ABBT	Jan, Feb, Aug	+,+,+	July, Nov	+,+	April, May, June, Aug	+,+,+,+,+
2	Ferozsons Laboratories Ltd. FERO	April, Nov	+,+	April, May, July, Sep	+,+,+,+,+,+	April, May	+,+
3	GlaxoSmithKline (Pak.) Ltd. GLAX	Aug	-	Nov	+		No Effect
4	Hightnoon Laboratories Ltd. HINL		No Effect	Jan, May	+,+		No Effect
5	IBL HealthCare Ltd. IBLH	June	-	May, Nov, Oct	+,+,+		No Effect
6	Otsuka Pak. Ltd. OTSU	Feb	-		No Effect	Jan, April, July, Aug, Dec	+,+,+,+,+,+
7	Sanofi-Aventis Pak. Ltd. SAPL	Feb, May	+,+	Jan, April, July, Nov, Dec	+,+,+,+,+,+	Jan, April, June, July, Dec	+,+,+,+,+,+,+
8	The Searle Co. Ltd. SEAR		No Effect	April	-		No Effect
9	Wyeth Pak. Ltd. WYTH	Feb, Nov	+,+	July	-	Feb, May	+,+,+
Power Generation & Distribution							
1	Altern Energy Ltd. ALTN	Aug, Nov	+,+	Jan, April, July, Aug, Dec	+,+,+,+,+,+	March, May, June, Dec	+,+,+,+,+
2	Arshad Energy Ltd. AEL	Jan, April, July, Nov, Dec	+,+,+,+,+	Jan, April, July, Nov, Dec	+,+,+,+,+,+	Jan, March, April, Aug, Dec	+,+,+,+,+,+
3	Hub Power Co. Ltd. HUBC	Jan, Feb, April, July, Sep	+,+,+,+,+,+	Low Sample Data			
4	K-Electric Ltd. KEL	March	+	March, April, July, Sep	+,+,+,+	March	-
5	Kohinoor Energy Ltd. KOHN		No Effect	Jan, Feb, April, July, Dec	+,+,+,+,+,+	Jan, April, July, Oct	+,+,+,+,+
6	Kohinoor Power Co. Ltd. KHPW	Nov	+	Jan, April, July, Aug, Dec	+,+,+,+,+,+	Feb, April, June, Dec	+,+,+,+,+,+,+
7	Kot Addu Power Co. Ltd. KAPCO	Oct	-	Feb, April, July, Aug, Nov	+,+,+,+,+,+	April, Aug	+,+
8	Nishat Chumian Power Ltd. NCPL		No Effect	April, June	+,+	March	-
9	Nishat Power Ltd. NPL		No Effect	Jan, Feb, July, Aug, Oct	+,+,+,+,+,+	March	+
10	Sitara Energy Ltd. SEL	July, Oct	+,+	Low Sample Data			
11	Tri-Star Power Ltd. TSPL	April	+	Jan, April, May, July, Dec	+,+,+,+,+,+		No Effect

Month of the Year Effect									
No	Complete Data Set			2019			During COVID 2020		
	Months	Returns	Months	Returns	Months	Returns	Months	Returns	
Refinery									
1	Attock Refinery Ltd. ATOR	March, July	+,+		Feb	No Effect	April, July	No Effect	
2	Byco Petroleum Pak. Ltd. BYCO	Jan	+		Feb	-	Feb	-	
3	National Refinery Ltd. NATR	Jan, March, April	+,+,+		Feb, March	-, -	Feb, March	-, -	
4	Pak. Refinery Ltd. PKRF	March, April, July, Dec	+,+,+,+,+		Feb, Aug	-,+	Feb, Aug	-,+	
Sugar & Allied Industries									
1	Adam Sugar Mills Ltd. ADSU	April, May, July, Nov	+,+,+,+,+	Jan, Feb, June, July, Dec		+,+,+,+,+,+	April, July	+,+	
2	Al-Abbas Sugar Mills Ltd. ALBS	July, Dec	+,+	Jan, April, June, Sep		+,+,+,+,+		No Effect	
3	Al-Noor Sugar Mills Ltd. ALNS	Feb, March, Oct	-, -	Jan, April, May, July, Nov		+,+,+,+,+,+	Jan, April, July, Aug, Dec	+,+,+,+,+,+,+	
4	Ansari Sugar Mills Ltd. ANSU	May, June, Oct	+,+,+	Aug		+	Jan, Sep	+,+	
5	Chashma Sugar Mills Ltd. CHSU		No Effect	Jan, June, July, Nov, Dec		+,+,+,+,+,+	April, May, Aug	+,+,+,+	
6	Dewan Sugar Mills Ltd. DWSU	Feb	-	Feb, April, July, Aug, Oct		+,+,+,+,+	Sep, Oct	+,+	
7	Faran Sugar Mills Ltd. FARS		No Effect	Jan, April, May, June, July		+,+,+,+,+,+	March, April, May, July, Dec	+,+,+,+,+,+,+,+,+	
8	Habib Sugar Mills Ltd. HABS	Jan, Feb, May, Oct	+,+,+,+,+	Oct, Nov		+,+,+	April, July	+,+	
9	Habib -ADM Ltd. HAL	Oct	-	Jan, April, July, Aug, Dec		+,+,+,+,+,+	Feb, Mar, April, July, Nov	+,+,+,+,+,+,+,+,+	
10	Haseeb Waqas Sugar Mills Ltd. HAWA	July, Aug, Nov	+,+,+	May, Aug, Nov		-, -	Jan, June, Nov	+,+,+,+,+,+,+,+	
11	Husein Sugar Mills Ltd. HUSA	June, Nov	+,+,+	Aug		-		No Effect	
12	Imperial Sugar Ltd. IMSL	April	-	Jan, Mar, April, July, Dec		+,+,+,+,+,+,+,+,+	March, April, May, June, Dec	+,+,+,+,+,+,+,+,+	
13	J.D.W. Sugar Mills Ltd. JDWS	May, July, Oct	+,+,+	Jan, April, July, Aug, Dec		+,+,+,+,+,+,+,+,+	Jan, Feb, April, July, Aug	+,+,+,+,+,+,+,+,+	
14	Janbarabad Sugar Mills Ltd. JAUH	Jan, April, May, July, Dec	+,+,+,+,+,+,+,+,+	Jan, May, July, Aug, Dec		+,+,+,+,+,+	April	-	
15	Mehram Sugar Mills Ltd. MEHS		No Effect	Jan, May, June, July, Sep		+,+,+,+,+,+	Jan, Feb, April, May, Dec	+,+,+,+,+,+	
16	Mirpurkhas Sugar mills Ltd. MPKS	Feb, Mar, May, June, Dec	+,+,+,+,+,+	Jan, Feb, June, July, Dec		+,+,+,+,+,+,+,+,+	Jan, April, May, June, Aug	+,+,+,+,+,+,+,+,+	
17	Noon Sugar Mills Ltd. NOON	Oct, Nov, Dec	+,+,+	Jan, April, June, July, Dec		+,+,+,+,+,+,+,+,+	Jan, April, July, Nov, Dec	+,+,+,+,+,+,+,+,+	
18	Premier Sugar and Distillery Ltd. PRES	Jan, April, June, Oct	+,+,+,+,+,+,+,+,+	Low Sample Data					
19	Sakrand Sugar Mills Ltd. SAKS	Feb, April, Nov	+,+,+	Oct		+		No Effect	
20	Sanghar Sugar Mills Ltd. SANS	Jan, April, May	+,+,+,+	Jan, April, May, July, Aug		+,+,+,+,+,+,+,+,+	Jan, April, June, July, Dec	+,+,+,+,+,+,+,+,+	
21	Shahmurad Sugar Mills Ltd. SHMS	Jan, Feb, April, June, Dec	+,+,+,+,+,+,+,+,+	April, Aug, Oct		+,+,+,+	May	+,+	
22	Shahhaj Sugar mills Ltd. SHAS	Feb, May, Aug, Nov	+,+,+,+,+	Jan, April, June, July, Oct		+,+,+,+,+,+	Jan, April, July, Nov, Dec	+,+,+,+,+,+,+,+,+	

Month of the Year Effect									
No	Complete Data Set	2019			During COVID 2020				
		Months	Returns	Months	Returns	Months	Returns		
23	Shakarganj Ltd. SHKS	June	-	Jan, April, July, Aug, Dec	+ + + + + + + +	July, Oct	-	-	-
24	Sind Abadgar Sugar mills Ltd. SNAB	Jan, March, June, Aug	+ + + + + +	Jan, April, May, Dec	+ + + + + + + +	Jan, April, June, July, Nov	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
25	Thal Industries Corporation Ltd. THLI	Jan, April, July, Aug, Nov	- - - - - + + + + +	Jan, April, May, July, Dec	+ + + + + + + +	Jan, June, Aug, Nov	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
Synthetic & Rayon									
1	Gatron Industries Ltd. GTRO	Jan, Feb, April, Aug, Sep	+ + + + + + + +	Jan, April, June, July, Nov	+ + + + + + + +	Feb, Mar, April, July, Aug	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
2	Inrahim Fibre Ltd. IBFL	Oct	-	Aug	-	Feb, March, April, June, July	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
3	Pak. Synthetic Ltd. PSYN	April, June, July, Oct	- - - - - + + + + +	Feb, March, April, Dec	- + + + + + + +	Jan, April, May, July, Dec	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
4	Rupali Polyester Ltd. RUPA	Feb, March, Nov	- - - - - + + + + +	Jan, April, May, July, Nov	+ + + + + + + +	Jan, April, July, Aug, Dec	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
5	Tri-star Polyester Ltd. TRIP	April	+ + + + + + + +		No Effect		No Effect	No Effect	No Effect
Technology & Communication									
1	Hum Network Ltd. HUMN	Aug, Sep	+ + + + + + + +	April, Aug, Nov	- + + + + + + +	April, May	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
2	Media Times Ltd. MDTL	Jan, Oct	- - - - - + + + + +	May	-				No Effect
3	NetSol Technologies Ltd. NTSL	Jan, July	+ + + + + + + +	April	-	March	-	-	-
4	Pak Datacom Ltd. PDCL	Feb	-	Jan, April, July, Oct, Dec	- - - - - + + + + +	March, April, June, July, Nov	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
5	TRG Pak. Ltd. TRGP	April, Aug	+ + + + + + + +	May, June, July	+ + + + + + + +	Nov	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
Textile Composite									
1	Artistic Denim Mills Ltd. ADML	Oct, Nov	+ + + + + + + +	Jan, April, June, July, Dec	+ + + + + + + +	Jan, April, June, July, Nov	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
2	Aruj Industries Ltd. ARUJ	March, July	+ + + + + + + +	Jan, April, May, June, Dec	+ + + + + + + +	Jan, April, May, June, Dec	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
3	Azgard Nine Ltd. AZNL	June	-	Feb	-	Feb	-	-	-
4	Bhanero Textile Mills Ltd. BHAN	Feb, Mar, June, July, Dec	+ + + + + + + +	Traded Less than 30 Days					
5	Blessed Textile Mills Ltd. BLET	June, Dec	+ + + + + + + +	Jan., June, July, Nov, Dec	+ + + + + + + +	Jan, April, June, Aug, Dec	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
6	Crescent Textile Mills Ltd. CRTX		No Effect	June, July	+ + + + + + + +	April, May, Dec	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
7	Dawood Lawrancepur Ltd. DWLP	Jan, Aug, Nov	+ + + + + + + +	Jan, April, June, July, Nov	+ + + + + + + +	March, April, July, Nov, Dec	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +
8	Faisal Spinning Mills Ltd. FASP	March, Aug	+ + + + + + + +	Traded Less than 30 Days					
9	Feroz 1888 Mills Ltd. FERZ	March, May, June, Nov	+ + + + + + + +		No Effect		No Effect	No Effect	No Effect
10	Gul Ahmed Textile Mills Ltd. GULA		No Effect	May, June	+ + + + + + + +	March, July	+ + + + + + + +	+ + + + + + + +	+ + + + + + + +

Month of the Year Effect									
No	Complete Data Set			2019		During COVID 2020		Returns	Months
	Months	Returns	Months	Returns	Months	Returns			
11	International Knitwear Ltd. INKL	March, April, June, Aug	+.+.+.+.+	Traded Less than 30 Days					
12	Kohinoor Mills Ltd. KML	Feb	-	Feb, Mar, April, July, Dec	-.-.+.+.+.+	Jan, Feb, June, Aug, Dec	+.+.+.+.+.+		
13	Kohinoor Textile Mills Ltd. KOHT	March, June	-.-	Mar, June, Aug, Nov, Dec	+.+.+.+.+.+				
14	Masood Textile Mills Ltd. MSOT	Feb, March, May, Oct	-.-.+.+.+	Jan, Mar, April, July, Sep	-.-.+.+.+.+	Feb, April, May			
15	Mehmood Textile mills Ltd. MAHM	Feb, March, Dec	-.-.+.+.+	Traded Less than 30 Days					
16	Nishat Chunian Ltd. NCHU	Feb, May, June, Sep	-.-.+.+.+	June, July	-.-	April, July			
17	Nishat Mills Ltd. NISM	Feb, April, June, Aug, Oct	-.-.+.+.+	May, June, July, Aug	-.-.+.+.+				
18	Quetta Textile Mills Ltd. QUET	Jan, April, July, Aug, Dec	+.+.+.+.+.+	Jan, April, July, Aug, Nov	-.-.+.+.+.+	April, June, July, Dec			
19	Reliance Textile Mills Ltd. REWM	Jan, April, May, July, Nov	-.-.+.+.+	Jan, April, July, Aug, Dec	-.-.+.+.+.+	Feb, April, May, June, Dec			
20	Sapphire Textile Mills Ltd. SAPT	Feb, Nov	-.-.+.+.+	Jan, April, May, July, Nov	+.+.+.+.+.+	Feb, March, May			
21	Shams Textile Mills Ltd. SHMT	June, July, Aug, Nov, Dec	-.-.+.+.+	Jan, April, July, Aug, Nov	+.+.+.+.+	Feb, Dec			
22	Suraj Cotton Mills Ltd. SURC	Feb, March, May, July	-.-.+.+.+	Jan, April, June, July, Aug	+.+.+.+.+	Jan, April, July, Aug, Dec			
23	Towellers Ltd. TOWL	Jan, April, May, July, Nov	+.+.+.+.+.+	Jan, April, May, Nov, Dec	+.+.+.+.+	Jan, April, May, July, Dec			
24	Zahidjee Textile Mills ZJEE	Jan, March, June, Oct	+.+.+.+.+	Jan, Mar, July, Nov, Dec	+.+.+.+.+	Feb, Mar, April, July, Dec			
Textile Spinning									
1	Babri Cotton Mills Ltd. BABR	Jan, April, May, July, Dec	-.-.+.+.+	Traded Less than 30 Days					
2	Chakwal Spinning Mills Ltd. CHSL	March, May, June, July	-.-.+.+.+	June	-	May, Oct			
3	Crescent Cotton Mills Ltd. CRES	March, April, July, Nov	-.-.+.+.+	Traded Less than 30 Days					
4	Crescent Fibres Ltd. CRFB	April, May, June, Nov	-.-.+.+.+.+	Traded Less than 30 Days					
5	D.S. Industries Ltd. DSIL		No Effect	May	-				
6	Dewan Farooq Spinning Ltd. DFSM	March, June	-.-		No Effect				
7	Din Textile Mills Ltd. DNTX	May, July, Aug, Oct	+.+.+.+	Traded Less than 30 Days					
8	Ellcot Spinning Mills Ltd. ELSP	Jan, April, June, July, Dec	-.-.+.+.+.+	Traded Less than 30 Days					
9	Fazal Cloth Mills Ltd. FZCL	Jan, April, July, Aug, Dec	-.-.+.+.+.+	Jan, April, May, July, Dec	-.-.+.+.+.+	March, April, July, Oct			
10	Gadood Textile Mills Ltd. GADT	March, June, Aug, Nov	-.-.+.+.+	March, June, May, Dec	-.-.+.+.+				
11	Hira Textile Mills Ltd. HRTX	Feb, Oct	-.-	June	+.+				

No	Month of the Year Effect									
	Complete Data Set					2019		During COVID 2020		
	Months	Returns	Months	Returns	Returns	Months	Returns	Months	Returns	Returns
12	Ideal Spinning Mills Ltd. IDES	Jan, June, July, Nov, Dec	+++++	Traded Less than 30 Days						
13	Idress Textile Mills Ltd. IDTX	March, April, Oct	+++	Jan, April, May, July, Dec	+++++	Jan, April, May, July, Oct, Nov	+++++			+++++
14	Indus Dyeing Manufacturing Ltd. INDY	Jan, April, Aug, Nov	+++++	Jan, April, May, July, Dec	+++++	Jan, March, April, July, Oct	+++++			+++++
15	Island Textile Mills Ltd. ISLT	Jan, Feb, April, Aug, Dec	+++++	Low Sample Data						
16	J.A. Textile Mills Ltd. JATX	Jan, April, July, Aug, Dec	+++++	Jan, April, May, July, Dec	+++++	Jan, April, May	+++++			+++++
17	J.K. Spinning Mills Ltd. ZHEET	Jan, April, June, July, Oct	+++++	Jan, April, July, Aug, Dec	+++++	Jan, April, July, Nov, Dec	+++++			+++++
18	Janana-de-Malucho Textile Ltd. JANND	Feb, June, Oct	+++	Traded Less than 30 Days						
19	Kohat textile Mills Ltd. KOTX	Jan, June, Aug, Nov, Dec	+++++	Traded Less than 30 Days						
20	Kohinoor Spinning Mills Ltd. KOHP	Jan, Mar, April, Aug, Nov	+++++	Oct		July, Oct				++
21	Maqbool Textile Mills Ltd. MQBT	Jan, Feb, April, June, Oct	+++++	Jan, April, July, Aug, Nov	+++++	Jan, April, July, Nov, Dec	+++++			+++++
22	Nagina Cotton Mills Ltd. NAGI	March, May	++	Jan, July, Aug, Nov, Dec	+++++	Jan, May, June, July, Nov, Dec	+++++			+++++
23	Premium Textile Mills Ltd. PRET	Jan, April, May, July, Nov	+++++	Jan, April, May, July, Dec	+++++	Jan, April, June, July, Nov	+++++			+++++
24	Ruby Textile Mills Ltd. RUBY	Feb, March, Nov	+++	Jan, May, June, July, Nov, Dec	+++++	Jan, April, May, June, Oct	+++++			+++++
25	Saif Textile Mills Ltd. SAIF	Jan, May, June, July, Aug, Oct	+++++	Jan, April, May, June, July, Aug, Oct	+++++	March, May, Dec				+++++
26	Salfi Textile Mills Ltd. SALF	Jan, Aug	+++	Traded Less than 30 Days						
27	Sana Industries Ltd. SANI	Jan, April, July, Aug, Dec	+++++	Jan, May, July, Nov, Dec	+++++	Jan, May, June, July, Aug, Dec	+++++			+++++
28	Saritow Spinning Mills Ltd. SARW	Feb, Mar, April, July, Dec	+++++	Jan, March, July, Aug, Dec	+++++	No Effect				No Effect
29	Service Textile Industries Ltd. SERT	May, June Oct, Nov	+++++	Jan, April, May, Aug, Dec	+++++	Jan, April, May, July, Dec	+++++			+++++
30	Sunrays Textile Mills Ltd. SUNT	Feb	+	Jan, April, May, July, Nov	+++++	Jan, April, May, July, Aug,	+++++			+++++
31	Tata Textile Mills Ltd. TATX	Jan, April, June, Aug, Nov	+++++	Jan, April, May, Aug, Dec	+++++	Feb, April, May, July, Dec	+++++			+++++

Month of the Year Effect						
No	Complete Data Set		2019		During COVID 2020	
	Months	Returns	Months	Returns	Months	Returns
	Textile Weaving					
1	Ashfaq Textile Mills Ltd. ASFQ	+,-,+,-,+	Traded less than 30 days			
2	Prosperity Weaving Mills Ltd. PWML	+,-	Jan, April, July, Nov, Dec	++++,+,-	Feb, April, July, Nov, Dec	+,-,+,-,+,-,+,-
3	Samin Textile Mills Ltd. SMTX	No Effect	Jan, May, July, Nov, Dec	++++,+,-	June, July	+,-
4	Service Fabrics Ltd. SVCF	++++,+,-	July, Nov	+,-	Feb, Dec	,-
5	Shahajaj Textile Mills Ltd. SHJT	++++,+,-	Jan, April, July, Nov, Dec	+,-,+,-	Jan, April, May, July, Dec	++++,+,-,+,-
6	Yousaf Weaving Mills Ltd. YOUS	++++,+,-	May, July	,-	May, Dec	+,-,+,-
7	Zephyr Textile Mills Ltd. ZTL	No Effect	April, May, July, Nov	+,-,+,-,+,-	Jan, Feb, May, June, Nov	++++,+,-
	Tobacco					
1	Khyber Tobacco Co. Ltd. KHYT	+,-,+,-,+	Jan, April, July, Aug, Dec	++++,+,-	March	,-
2	Pak. Tobacco Co. Ltd. PAKT	No Effect	Jan, April, June, July, Aug	++++,+,-	Jan, April, Aug, Nov, Dec	++++,+,-
3	Philip Morris (Pak.) Ltd. PHIM	+,-	Jan, Feb, July, Aug, Dec	+,-,+,-,+,-	Jan, June, July, Aug, Oct	++++,+,-,+,-
	Transport					
1	Pak. International Container Ltd. PICT	,-	March, Oct	+,-	Jan, Feb, June, Aug, Nov, Dec	+,-,+,-,+,-,+,-
2	Pak. National Shipping Corp. Ltd. PNSC	,-		No Effect	April	+,-
	Vanaspati					
1	Punjab Oil Mills Ltd. PIBO	+,-,+,-	Jan, April, June, July, Dec	+,-,+,-,+,-	Feb, March, April, July, Nov	++++,+,-,+,-
2	S.S. Oil Mills Ltd. SSOM	++++,+,-	Jan, April, June, July, Dec	++++,+,-	Feb, Aug, Nov	++++,+,-
3	Unity Foods Mills Ltd. UNITY	++++,+,-	Feb, May	,-		No Effect
	Woolen					
1	Bannu Woolen BNU	No Effect	Jan, April, July, Aug, Dec	+,-,+,-,+,-	Jan, Feb, April	+,-,+,-

Conclusion

The study examines the impulsive behavior of renowned calendar anomalies over time patterns and, during which market, stipulates these irregularities to outperform. The study provides evidence of supporting contradictions of EMH theory after observing a pragmatic view of the dataset after the financial crisis January, 2009 to June 2021. In terms of return predictability, this study is essential for international and domestic investors, and it may affect their investment strategy and return management. Moreover, the results might be interesting to the financial experts as they ponder the available conditions in the capital market for financial decision-making.

The monthly results indicated the “Month-of-the-Year” effect to be significant for KSE30 and KSE All Share index, with positive July and negative May and June effects. In contrast, the KSE100 index has not detected any monthly anomaly in the entire sample period. A considerably different and instantaneous pattern of anomalies is observed in comprehensive individual firms’ analyses. Individual firms showed remarkably high positive July contrasted to negative May and June effects, as suggested by (Zafar et al., 2010), which may be due to the annual budget announcement in May, approval in June and implementation in July. Also, a greater percentage of firms showed positive January and April in most sectors. Few sectors have also depicted the September effect detected by (Akash, Mahmood, & Ghafoor, 2020; Rafique & Shah, 2012), but indices provided a very different view of findings in this respect. A thorough firm-level analysis identified a positive July effect in various sectors, which explains the tax-loss selling hypothesis, while indices do not have a very consistent pattern of this monthly anomaly.

A joint negative April effect is detected in BOM (beginning of the month) while testing for the turn of the month effect in all three sample periods supporting the stance that firms have the annual report submission requirement at the end of March (Alagidede & Panagiotidis, 2009). In contrast, the pre-COVID period displayed a positive August while the COVID period presented a negative February. Contrary to these results, end of the month, the whole sample identified May and June, the pre-COVID period in August and the COVID period detected in March, April and September in the EOM (end of the month) period. The findings are interpreted by the cash flow hypothesis (Cadsby & Ratner, 1992; Ogden, 1987; Ziemba, 1991) as the pay-off date for accumulated wages, dividends, interest, principal payments and other liabilities are associated with this sample period.

Due to global pandemic conditions, investor psychology turned circumspect. Consequently, the individual firms’ trading has also reduced. Followed by January and August, a few indicators presented February negative seasonality. Also, significant and positive September and November with considerably higher coefficients displayed market inefficiency. These results support the findings of individual firm analysis with a prominent September effect, although these findings are contradictory to the detected anomalies in indices returns in a few cases.

As the sample period cover a period of diverse political regimes in Pakistan along with turbulent global financial period thus the circumstances during the whole sample covers a lot of other factors which cannot be ignored. These downturns might be connected to the major events influencing financial markets around the world, including the series of triggering events that initiated with the collapse of housing bubble in the United States housing bubble during 2005–2012, reduction in interest rates by the European Central Bank (ECB) and highest unemployment level across the Eurozone in 2009 Greece crisis 2008-2016.

Declarations

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Conflicts of interest/Competing interests

There is no conflict of interest/Competing interests.

Availability of data and material

The data that support the findings of this study are openly available on the website of State Bank of Pakistan(<https://www.sbp.org.pk/>)& Pakistan stock exchange(<https://www.psx.com.pk/>).

Code Availability

The computer program results are shared through the tables in the manuscript.

Authors' Contributions

Farah Naz: Conceptualization, Methodology, Investigation, Writing – original draft.
Kanwal Zahra: Writing – review and editing, Project administration.
Tooba Lutfullah: Data curation, Writing – review and editing.

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