Past and Future of Derivative/Future Market: Substantiation of Calendar Anomalies

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The study examines the calendar anomalies in four major commodities at Pakistan Mercantile Exchange (PMEX). This study uses OLS regression analysis technique which covers 6 years' time period from January 2011 to December 2016. We have tested four major calendar anomalies namely; Monthly anomaly, Turn-of-the-year anomaly, Day-of-the-week anomaly, and Turn-of-the-month anomaly. Overall, results have supported the market inefficiency. The results of Monthly Anomaly show that the April and January effect is found for Crude Oil and KIBOR. Likewise, the returns for Palm Oil outperform in February and March. However, there is no evidence of Monthly anomaly for Gold. The results of Turn-of-the-year anomaly show that Crude Oil has Turn-of-the-year (TOY) anomaly and in KIBOR, Rest-of-the-year (ROY) anomaly exists. No significant evidence is found for Gold and Palm Oil regarding the same. The Friday effect is found in Gold' returns and the Monday effect is found in KIBOR' returns for Day-of-the-week anomaly. Turn-of-the-month Anomaly shows that KIBOR' returns are considerably high for the days of Rest-of-the-month (ROM).

Keywords: calendar anomalies, Pakistan mercantile exchange, abnormal commodity returns, behavioral finance

Standard finance theory advocate efficient market hypothesis (EMH). It suggests that market prices incorporate all the related and essential information so it is impossible to beat it (Fama, 1970). In addition, studies related to stock splits and the behavior of stock prices also supports EMH (Basu, 1977; Fama, 1965). In support of EMH, Malkiel (1973) proposed the random walk theory which states that prices are impossible to predict as they follow a random pattern. However, in reality, there are some stock price patterns that can lead to abnormal returns and cause market anomalies. Announcement impact study brings a challenge to EMH (semi-strong form). It implies that individual investor can take the valuable information and try to earn abnormal returns by gathering all relevant available information from the public for the companies and identify the variables which may affect the prices of stock and other economic factors as well. Therefore the semi-strong form of EMH rejects the purpose of fundamental analysis.

The normal investor has populated Behavioral finance (BF) rather than rational ones, and market inefficiency is caused by the irrational behavior of normal investors (Statman, 2010). Every investor is affected by the behavior of other investors in the market which as a total affects the behavior of the market. Additionally, this initiates a series of reaction in the market which leads to market anomalies. In developing commodity markets, Pakistan Mercantile Exchange (PMEX) is of great importance so it requires a study on anomalies present in it. Likewise, the anomalies in the stock market, commodity market anomalies are also of great importance.

Evidence from recent studies has shown several abnormalities known as market "anomalies", which put efficient market theory in doubt. Our main focus is on four calendar anomalies namely; Monthly anomaly, Turn-of-the-month anomaly, Day-of-the-week anomaly and Turn-of-the-year. Most studies have

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focused on calendar anomalies while investigating the EMH for a specified time period yet little attention has been paid to the under-developed countries like Pakistan. Market become inefficient as the result of irrationality which affects the stock prices. It also discovers the number of gain market participants gets through abnormal returns. (Thaler, 1999).

In this research study, the key investigation is to study calendar anomalies in PMEX. Prior studies regarding calendar anomalies considered only the Pakistani stock market (Ali, Mustafa, & Zaman, 2001; Hussain, Hamid, Akash, & Khan, 2011; Kamal & Nasir, 2005; Mohammad Naeem Shahid, 2015; Shaheen, 2008; Ullah, Ullah, & Usman, 2010) and no attention has been paid on testing the calendar anomalies in commodity market. The main purpose of this study is to focus on calendar anomalies in the PMEX to examine and find anomalies which lead us to find whether the returns volatility differs for a specific period in PMEX and whether seasonal patterns are present in PMEX because of the instability in PMEX.

Research Questions
In this study, we try to answer the following questions based on four considered calendar anomalies.

Q_1: Which month produces high commodity market returns as compared to other calendar months?
Q_2: Which Day-of-the-Week generates positive and highest commodity market returns?
Q_3: Whether Turn-of-the-Year anomaly exists in the commodity market?
Q_4: Whether Turn-of-the-Month anomaly prevails in the commodity market?

There are four objectives of the study. First one is to scrutinize the existence of calendar anomalies in PMEX. The second one is to detect the presence of monthly anomaly in PMEX. Thirdly, to detect the existence of the Day-of-the-Week anomaly in PMEX and the fourth one is to examine and analyze the presence of Turn-of-the-Year and Turn-of-the-Month anomaly in PMEX.

For any investor looking to take a stab at the commodity market, it can be appealing to search for ways to "beat the market" and take advantage of anomalies. This can be used only to inform the investor's decisions and help them make more refined investment choices. The future market has a lot of hedgers and their aim is to minimize the risk they face in the future market. To minimize the market risk at the minimal level, a company or an individual uses future markets to evade the risk and take a safe position. In the case of market inefficiency, due to market anomalies, correct and well-timed information is of huge importance. By hedging, investors can dodge unpleasant surprises, such as a sharp rise in the prices of commodities that are being traded. To reach abnormal profit, an investor tries to make policies which are useful in investment based on withdrawing/investing in specific stock, portfolio or commodity in specific times. In behavioral finance, behavior related to psychology and cognitive biases have an enormous influence on the decision making of the investor and hold their financial personality. Previous studies related with market anomalies mainly, fundamental and calendar anomalies are very much influenced by the behavior of investor. Certainly, there is a strong requirement to explore the causes and effects on commodity prices which will be really supportive for individual investor as well as for portfolio managers to correctly categorize investments.

This exploratory study will help local and foreign investors. They can allocate their assets in a more effective way by using derivative market and portfolio management. This study will also be helpful to SECP and government for better implication and regulation of their policies. They may prohibit specialists and insiders to have access to private information. When the calendar market anomalies are detected, SECP will well advise the companies to follow rules and indicate the anomalies in their financial reports.

Literature Review
January anomaly was first discovered by Wachtel (1942) in the US. This anomaly implies that there is a systematic pattern in calendar months. Therefore, there is variation exist in returns of calendar months (Gultekin & Gultekin 1983). Days-of-Week Anomaly is discovered by Gibbons and Hess (1981). It explains

that returns are on average high on Friday as compared to other days. Some evidence of the largest variation on Monday and lowest is on Friday. Turn-of-the-Month Anomaly shows that the average returns are high in initial days of the month as compared to the rest of days of the month. Cadsby and Ratner (1992) state that the Turn-of-the-Year returns are high in December and January. There are many studies which discover the Turn-of-the-Year effect. For instance, Lakonishok and Smidt (1984), Sikes (2014) and Tangjitprom (2011). According to existing empirical findings, different months dominate in different stock markets. After reviewing the empirical literature, we find that many types of research have been conducted to examine calendar anomalies in different markets. For instance, Kumar (2016) has found the January phenomenon and monthly anomaly Kayaçetin and Lekpek (2016) has discovered TOM pattern in Turkish Equity Market. They found TOM anomaly is strong and significant in the last three trading days of each month. Moreover, Ţilica (2015) finds Intra-Month effects on the Bucharest Stock Exchange. They conclude that there is no evidence for the semi-monthly effects the BET composite index but Turn-of-the-month is present in the BET.

Furthermore, Gebka, Hudson, and Atanasova (2015) have conducted research on seasonal anomalies. They have found the Turn-of-the-month effect. They suggest that moving average rule and Halloween effect can be combined to achieve a significance level of predictability of returns and to achieve more profitable trading. In addition, Kumar and Pathak (2016) have investigated calendar anomalies Day-of-the-Week and Monthly anomaly for two important time span pre and post period of financial crises 2008 in Indian currency market. Halari, Tantisantiwong, Power, and Helliar (2015) have tested the stock market of Pakistan for Islamic monthly anomalies. There is a slight statistical indication of a Monthly anomaly but evidence of Monthly anomaly is present in KSE. Sikes (2014) has examined the evidence about the TOM anomaly due to tax-loss selling by institutional investors in the US, In addition, they have weak window-dressing incentives which lead to Turn-of-the-Year effect in the US.

Floros and Salvador (2014) have attempted to investigate the Day-of-week and Monthly seasonal effects in stock index futures returns conclude that the calendar effects depend upon the market situation. When the volatility is low then calendar effects are positive and negative when the market is highly volatile. On the other hand, Lee, Hsu, and Ke (2013) examine the monthly effect in agriculture futures of the U.S which includes soya, bean meal, corn, soya bean, and wheat. They identified that October returns dominated in Corn, April dominated in soya bean and August dominated in soya bean meal and wheat. Furthermore, patterns of different kinds are present across four futures and results support towards monthly-anomaly. Maher and Parikh (2013) have observed whether the Turn-of-the-Month effect is present in Indian stock market or not? They have found that Turn-of-the-Month is present in Indian stock market. The main reason for the Turn-of-the-Month effect is that foreign and domestic traders considerably increase their trading volumes on the buying side at the end of the month which pushes the prices up.

Griffiths and White (1993) examine the TOM anomaly in Canadian stock exchange. Intraday of stock prices is taken from the Toronto Stock Exchange (TSE). The stock return is a function of bid-ask prices. TOY returns are considered positive. Ritter and Chopra (1989) have examined the TOY effect in the US. They conclude that in January and December, inferences are sensitive to weighting procedure. It happened because of patterns in small firm returns. Lakonishok and Smidt (1984) also investigate the Turn-of-the-year anomaly in all firms listed at New York Stock Exchange and concluded the existence of a pattern in the year-end for small companies' returns.

Motivation and Hypothesis development
In finance literature, there are two specific bodies that fascinate us. The initial section of the literature is the EMH; the second section of the literature is the calendar anomalies hypothesis. Fundamentally, the origin of our idea is that we assert that calendar anomalies hypotheses defy the EMH. Our research examines whether the random walk nature and efficient market of commodity prices cause

market anomalies. If the said case is possible then, we inspect that is it possible for the investors to achieve abnormal returns by exploiting the market information. Based on the above, we have constructed four specific hypotheses:

H_{01}: Monthly anomaly persists for commodities listed on PMEX.

H_{02}: DOW effect subsists for the returns of commodities listed on PMEX.

H_{03}: There is a difference of commodity returns in TOM trading days as compared to   non-TOM trading days for PMEX.

H_{04}: The commodity returns of TOY are high as compared to non-TOY months for PMEX.

Method

Data and Sample Characteristics

Monthly and daily commodity prices of major commodities namely; gold, KIBOR, Palm Oil and Crude Oil traded at Pakistan Mercantile Exchange (PMEX) are taken from the official website of PMEX. Balance panel data is used that covers a 6-years' time period ranging from January 2011 to December 2016 by using Ordinary Least Square (OLS). Among many techniques, for instance, ANOVA and generalized linear models, OLS regression is a major one to examine the data and provides the basis for other techniques. Through the use of dummy variable, the significance of this technique can be enhanced greatly. For the sake of analysis of experimental designs, it includes explanatory variables by using data transformation and regression. OLS is fairly easy to check and also very powerful, which can verify the model assumptions such as constant variance, linearity, and the outlier's effect by using simple graphical methods. (Craven & Islam, 2011). Commodity returns calculation idea is taken from the study of Fong, Wong, and Lean (2005), Kumar and Pathak (2016) and Tangjitprom (2011).

$$CR_{it} = \ln\left(\frac{P_{it}}{P_{it-1}}\right) * 100 \qquad\qquad (1)$$

where,

CR_{it} is commodity return of ith commodity at time t

P_{it} is current price of ith commodity at time t

P_{it-1} is the first lag of ith commodity at time t

Data Analysis Technique

In order to test calendar anomalies in commodity market OLS regression analysis is used. Following are the anomalies estimation equations and their descriptions.

Monthly Anomaly

For Monthly anomaly, we examine that whether the monthly average of daily returns of January is significantly different from the rest of eleven months (Halari et al., 2015; Kayaçetin & Lekpek, 2016; Kumar, 2016). For this, we run the following equation.

$$R_t = \alpha + \delta_1 D_{1t} + \delta_2 D_{2t} + \cdots \delta_{11} D_{11t} + \epsilon_t \qquad\qquad (2)$$

Where α represents January returns or base dummy for January, $\delta_1 \dots \delta_{11}$ are the coefficients for remaining calendar months. The variables $D_1 \dots D_{11}$ are dummy variables for remaining eleven months and have value of 1, if the monthly returns take place in that month, and otherwise zero and error term is signified by ϵ_t.

The Day-of-the-Week Anomaly

To test the second anomaly that is DOW anomaly, we examine whether days-of-the-week have different average daily returns as compared to Monday (Abbas & Javid, 2015; Ajayi, Mehdian, & Perry, 2004; Compton, A. Kunkel, & Kuhlemeyer, 2013; Haroon & Shah, 2013). Second test equation is:

$$R_t = \alpha + \delta_1 D_{1t} + \delta_2 D_{2t} + \cdots \delta_4 D_{4t} + \epsilon_t \qquad\qquad (3)$$

Where, α represents the base dummy for Monday, coefficients $\delta_1 \dots \delta_4$ show the coefficients values for the remaining days. $D_1 \dots D_4$ represent dummy variables for remaining four days. If the average daily return occurs on that specific DOW then its value is 1 or else zero. Error term is symbolized by ϵ_t for this equation, if the null hypothesis is rejected then we suggests the presence of the DOW anomaly.

The Turn-of-the-Month Anomaly

To test TOM anomaly, we check average daily returns of TOM difference with rest-of-the-month (Kuhlemeyer et al, 2013), the following equation is used.

$$R_t = \alpha + \delta D_{TOM} + \epsilon_t \qquad (4)$$

Where α represents the average commodity returns that is base dummy and it is for ROM time period, δ represent the change between mean of TOM returns and the mean of ROM returns. D_{TOM} represents binary variable of TOM. Error term is presented by ϵ_t. Rejection of null hypothesis manifests the indication that the TOM effect exists.

The Turn-of-the-Year Anomaly

A similar procedure is being used for Turn-of-the-Year anomaly (TOY). To examine that the monthly mean returns for the TOY are different from the rest-of-the-year average of monthly returns, (Compton et al., 2013; Kumar, 2016). For this, we use the following equation:

$$R_t = \alpha + \delta D_{TOY} + \epsilon_t \qquad (5)$$

Where α represents, the base dummy and the average returns for ROY period, δ is the change among the average TOY returns and the average ROY returns, D_{TOY} represent a binary variable for the TOY. Error term is specified by ϵ_t. With the rejection of null hypothesis it would indicate that the TOY effect exists in PMEX.

Results

Results of Monthly Anomaly

Table: 1 presents month vise descriptive statistics of all four commodities. When we look at the mean returns of Crude Oil panel, the highest commodity returns occur in the month of April that is 0.326 with St.dev 0.502. March comes at second and February at third with mean returns and standard deviation (St.dev) are 0.147 (0.397) and 0.109 (0.296) respectively. However, July shows the highest negative returns with mean value -0.224 and St.dev 0.473. Similarly, April month has the highest returns in a Gold panel with returns of 0.210 and St.dev 0.399. January and July come at the second and third position with mean and St.dev value 0.141(0.323) and 0.132(0.288), respectively. In the panel of KIBOR the highest commodity returns are in October 0.0231 (0.032) followed by January 0.193 (0.023) and July month 0.015(0.014). Turning towards the Palm Oil panel, February returns 0.139(0.218) are high as compared to other months. In sum, we can say that month vise returns are not same there is a tendency of month anomaly for each considered commodity.

Table: 1

Descriptive Statistics of Monthly Anomaly

Months	Crude Oil		Gold		KIBOR		Palm Oil	
	Mean	St.dev	Mean	St.dev	Mean	St.dev	Mean	St.dev
January	-.7976	1.8637	.1419	.3231	.0193	.0231	-.1239	.1088
February	.1098	.2967	.0998	.3229	-.0007	.0067	.1399	.2188
March	.1474	.3967	-.0148	.0702	-.0053	.0123	.0796	.2739
April	.3262	.5025	.2103	.3999	.0078	.0028	.0206	.0847
May	-.1775	.4076	-.1422	.1335	.0147	.0233	.0211	.1881
June	-.0462	.2193	-.0562	.3496	-.0141	.0171	-.0915	.1589
July	-.2245	.4735	.1326	.2887	.0150	.0147	-.0694	.0962
August	.0944	.2785	.0614	.4820	.0143	.0306	-.0601	.3011
September	-.2127	.2745	-.1552	.2865	-.0026	.0158	-.0839	.2427
October	-.0725	.4492	.0027	.1395	.0231	.0328	-.0489	.1060
November	-.0449	.3933	-.1088	.2563	.0023	.0145	-.0158	.2122
December	.0905	.3470	-.2961	.2722	-.0078	.0084	.0385	.0932

Note: Month vice average returns and standard deviation are presented for Crude Oil, Gold, KIBOR, and Palm Oil.

Table 2 shows the results of dummy regression. We have run monthly dummy regression for each commodity separately. The table shows the output of the regression analysis. For crude oil, regression results have confirmed that April month outperformed as compared to others and its coefficient 1.1239 significant at 1 % level. However, March and February months also show positive and significant abnormal returns with coefficient values 0.945 and 0.907 respectively. The value of R square is almost 44% which shows that 44% variation is showed by independent variables (month's dummies) in dependent variable (monthly returns).

F-value 3.963 shows that the overall model is significant at 5% level of significance. Now turning towards the results of Gold, as evident, there is no positive and significant abnormal returns exist in either month. However, we can observe that December returns are negative -0.438 and significant at 5% level. Value of R square is 41.02% and F-value is 4.2613 significant at 5% level. January anomaly exists in KIBOR. As the results show that the KIBOR coefficient is 0.0193 which is significant at 5% level. F-value 6.017 also shows that the model is overall good and statistically significant at 5% level of significance. R square goodness of fit is 46.11% which is also quite reasonable. For palm oil, February and March both months show positive and significant result at 5% level of significance. It implies that both months are beneficial for investors and have positive abnormal returns as compared to other months. F-values 7.433 shows that the model is significant at 5%. In sum, the results of the monthly anomaly show the gold market seems efficient as compared to the remaining three commodities.

Table: 2

Regression Results of Monthly Anomaly

Months	Crude Oil		Gold		KIBOR		Palm Oil	
	Coef	P-value	Coef	P-value	Coef	P-value	Coef	P-value
January	-.7976***	0.004	.1419	0.351	.0193**	0.016	-.1239	0.112
February	.9075**	0.019	-.0421	0.844	-.0200*	0.073	.2638**	0.018
March	.9451**	0.015	-.1568	0.465	-.0247**	0.028	.2036**	0.046
April	1.1239***	0.004	.0684	0.737	-.0115	0.299	.1446	0.189
May	.6201	0.105	-.2842	0.166	-.0045	0.680	.1451	0.187
June	.7514*	0.051	-.1982	0.332	-.0335***	0.003	.0323	0.767
July	.5731	0.133	-.0093	0.963	-.0043	0.695	.0544	0.618
August	.8921**	0.021	-.0804	0.681	-.0049	0.653	.0638	0.560
September	.5849	0.126	-.2972	0.133	-.0219**	0.050	.0399	0.715
October	.7251*	0.059	-.1392	0.478	.0037	0.731	.0749	0.494
November	.7527*	0.050	-.2508	0.203	-.0169	0.128	.1080	0.325
December	.8882*	0.028	-.4381**	0.029	-.0272**	0.016	.1625	0.141
R Square	0.4426		0.4102		0.4611		0.3987	
F-Value	3.9636	0.045	4.2613	0.046	6.0175	0.035	7.4331	0.05

Note: The results of monthly anomaly are presented for each considered commodity by using dummy regression. *, **, *** show 10%, 5%, 1% level of significance.

Results of Turn-of-the-Year Anomaly

Table: 3, presents the descriptive statistics of the Turn-of-the-Year anomaly. As the name implies that the commodity returns are high in Turn-of-the-Year or December of last years and January of the following years. The table is divided into four panels based on selected four commodities Crude Oil, Gold, KIBOR and Palm Oil, TOY shows the mean returns of Turn-of-the-Year and Rest-of-the-Year (Bhardwaj & Brooks) shows the commodities returns of ROY months. In Crude Oil panel, mean returns of TOY -.0146 (1.995) is high as compared to ROY -.0579 (2.543). Turning towards the descriptive statistics of Gold, mean return of gold for TOY is .0134, which is high from ROY -.0123. KIBOR also show the results in favor of ROY. On the other hand, palm oil shows highest mean returns for ROY months with average commodity returns .0055 and St.dev 0.948.

Table: 3

Descriptive Statistics of Turn-of-the-Year Anomaly

Months	Crude Oil		Gold		KIBOR		Palm Oil	
	Mean	St.dev	Mean	St.dev	Mean	St.dev	Mean	St.dev
TOY	-.0146	1.9954	.0134	1.1215	.0033	.0648	-.0313	.9521
ROY	-.0579	2.5434	-.0123	1.1977	.0082	.1332	.0055	.9484

Note: TOY monthly average returns and standard deviation are presented for Crude Oil, Gold, KIBOR, and Palm Oil.

In sum, the results of descriptive statistics show that there is a prediction of the existence of the TOY anomaly in Gold and Crude Oil. For this purpose, we apply the analysis technique and the results are shown in Table 4.

Table: 4

Regression Results of Turn-of-the-Year Anomaly

Months	Crude Oil		Gold		KIBOR		Palm Oil	
	Coef	P-value	Coef	P-value	Coef	P-value	Coef	P-value
TOY	-3.2859*	0.086	.4170	0.337	-.0154	0.552	.0032	0.993
ROY	-.5039	0.483	-.0202	0.903	.0195*	0.059	.0235	0.868
R Square	0.412		0.385		0.455		0.401	
F-Value	5.0864	0.093	3.9468	0.083	5.5517	0.087	9.9929	0.091

Note: The results of the Turn-of-the-Year anomaly are presented for each considered commodity by using dummy regression. *, **, *** show 10%, 5%, 1% level of significance.

The table shows the commodity vise estimation results for TOY and ROY months. There is no tendency of any TOY or ROY anomaly in Gold and Palm Oil. It implies that Gold and Palm Oil markets seem efficient as there is no evidence of significant abnormal returns. We find interesting results for Crude Oil and KIBOR. The results show that TOY anomaly exists for Crude Oil and significant results at 10% level along goodness of fit F-value 5.0864 is also shows that the model is overall good fit. R-value is 41.2% which shows that the coefficient of TOY months conveys the signals to investors that on average the return of investing in TOY time span is high as compared to ROY and investors can do hedging strategies in order to avoid from negative returns in PMX. For KIBOR, the results are significant for ROY months rather than the existence of TOY anomaly. The results show positive and significant results at 10% level of significance with coefficient value 0.0195. Its R-square value is 45.5% implies that 45.5% variation in dependent variable is explained by independent variables.

Results of Day-of-the-Week Anomaly

Table: 5 shows the results of the Day-of-the-Week Anomaly. Monday is outperforming in Crude Oil with an average return of 0.207 and St.dev 1.959. Thursday and Tuesday also show positive returns that are 0.058 and 0.039, respectively. For Gold, the highest value of mean return is for Friday. Monday and Friday are outperforming in KIBOR. However, Palm Oil results show poor performance for the whole week except for Friday. For Friday, it shows a positive return with the magnitude of 0.025 with the St.dev 0.856.

Table 5

Descriptive Statistics of Day-of-the-Week Anomaly

Months	Crude Oil		Gold		KIBOR		Palm Oil	
	Mean	St.dev	Mean	St.dev	Mean	St.dev	Mean	St.dev
Monday	.2070	1.9590	-.0475	1.1977	.0103	.1441	-.0252	1.2513
Tuesday	.0390	3.1002	-.0581	1.0036	.0056	.0797	-.0579	.8775
Wednesday	-.0854	2.0630	-.0317	1.1797	.0026	.0346	-.0019	.9330
Thursday	.0584	1.9474	.0201	1.1069	-.0013	.1011	-.0167	.7665
Friday	.0277	1.9447	.1311	1.2729	.0103	.1086	.0253	.8564

Note: Weekly average returns and standard deviation are presented for Crude Oil, Gold, KIBOR, and PalmOil.

The results of the DOW estimation anomaly are reported in Table 6. The Crude Oil and Palm Oil returns are efficient and conclude there is no tendency of any Day-of-the-Week effect in Crude Oil and Palm Oil. On the other hand, we find the Friday effect in the Gold market. The coefficient of Gold is 0.1785 with p-value 0.091 that is significant at the 10% level of significance. For KIBOR we find a significant Day- of-the-Week effect in favor of Monday. In sum, for Gold, we find the Friday effect and for KIBOR we discover Monday effect, as through F statistics 5.535 with its p-value of 0.046 shows that overall models are significant at 5% level.

Table 6

Regression Results of Day-of-the-Week Anomaly

Months	Crude Oil		Gold		KIBOR		Palm Oil	
	Coef	P-value	Coef	P-value	Coef	P-value	Coef	P-value
Monday	-.2063	0.112	-.0474	0.524	.0102*	0.071	-.0251	0.642
Tuesday	.2453	0.181	-.0107	0.919	-.0046	0.566	-.0327	0.668
Wednesday	.1208	0.509	.0156	0.881	-.0076	0.341	.0232	0.761
Thursday	.2647	0.148	.0675	0.520	-.0116	0.148	.0083	0.912
Friday	.2340	0.112	.1785*	0.091	.00006	0.993	.0505	0.510
R Square	0.4620		0.3691		0.3912		0.4218	
F-Value	7.5610	0.049	5.3632	0.086	5.5350	0.046	6.8655	0.062

Note: The outcomes of DOW anomaly are presented for each considered commodity by using dummy regression. *, **, * show 10%, 5%, 1% level of significance**

Results of Turn-of-the Month Anomaly

In Table 7, we present the average mean returns and standard deviation of all four considered commodities for TOM and ROM days. For Crude Oil both, TOM and ROM mean returns are negative but TOM shows high returns as compared to ROM. For Gold, TOM returns are high with the magnitude of 0.013 as compared to ROM -0.012. However, based on descriptive statistics, we infer that ROM returns are high for both KIBOR 0.008 and Palm Oil 0.005 as compared to TOM.

Table: 7

Descriptive Statistics of Turn-of-the-Month Anomaly

Months	Crude Oil		Gold		KIBOR		Palm Oil	
	Mean	St.dev	Mean	St.dev	Mean	St.dev	Mean	St.dev
TOM	-.0146	1.9954	.0134	1.1215	.0033	.0648	-.0313	.9521
ROM	-.0579	2.5434	-.0123	1.1977	.0082	.1332	.0055	.9484

Note: TOM returns and standard deviation are presented for Crude Oil, Gold, KIBOR, and PalmOil.

The estimation results of Turn-of-the-Month anomaly are presented in Table 8. While examining the commodity vise regression results, results support only for KIBOR. As predicted in Table 7, we find significant results for KIBOR only and that is for ROM effect. It implies that KIBOR has significant abnormal returns for ROM days and rests of commodities returns are efficient. The coefficient of KIBOR is 0.0082 with its p-value 0.033 that is significant at 5% level of significance. F-value 4.340 shows that the model is overall fit and 39% variation is explained by the value of R square. None of the findings shows any significant results for remaining commodities for Crude Oil, Gold, and Palm Oil. In sum, based on the empirical results, there is some evidence of calendar anomalies. Therefore, we can say that Pakistan Mercantile Exchange (PMEX), is somewhat not efficient market and arbitrageurs can get abnormal returns by adapting investing strategies based on seasonal patterns. In addition, our results also suggest that the magnitude of abnormal returns of commodities is low due to low volatility in PMEX. The possible reason may be that the fluctuation in commodity prices is low as compared to stock prices but it does not mean that abnormal profit is not possible even after incorporating the trading cost. Mostly trading in commodities and stocks happens in bulk so, there are possibilities to gain abnormal returns.

Table: 8

Regression Results of Turn-of-the-Month Anomaly

Months	Crude Oil		Gold		KIBOR		Palm Oil	
	Coef	P-value	Coef	P-value	Coef	P-value	Coef	P-value
TOM	.0433	0.711	.0257	0.701	-.0049	0.341	-.0368	0.450
ROM	-.0579	0.511	-.0123	0.807	.0082**	0.033	.0055	0.880
R Square	0.4611		0.4001		0.3901		0.4231	
F-Value	3.9108	0.098	6.7108	0.064	4.3405	0.046	5.4496	0.089

Note: The results of Turn-of-the-Month anomaly are presented for each considered commodity by using dummy regression. *, **, *** show 10%, 5%, 1% level of significance.

Conclusion

We discover that the calendar anomalies have somewhat mix and significant results for Pakistan Mercantile Exchange. As evidence shows that like Pakistan Stock Market there is the existence of abnormality and inefficiency in Pakistan Mercantile Exchange as well. The outcomes have dynamic practical implications for different capital and commodity market participants such as arbitrageurs, investors, researchers/academics, managers, and policymakers. Precisely, our results specify that the Investors can structure their investment tactics and predict commodity return patterns and get abnormal returns by making trading strategies accordingly. More commodities can be included in order to generalize the results of Pakistan Mercantile Exchange. In behavioral finance, there are behavioral biases which cause the market anomalies, so future research can be done to explore which biases cause the market anomalies.

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