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Monday Anomaly Manifests Adaptive Behavior. A Firm Level Evidence from Emerging Market

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Abstract: The paper attempts to enhance the prevailing literature on AMH (Adaptive market hypothesis) and calendar anomalies by first time linking the Monday effect with Adaptive Market Hypothesis that permits the performance of well-known Monday effect to fluctuate over time. For the purpose we inspect the daily returns of 107 individual firms listed at Pakistan Stock Exchange over the period of 20 years (from January 1996 to December 2015). To explore the varying degree of return predictability of Monday effect we utilize four different subsamples comprising equal length of observations of five years each. We find return predictability of Monday effect evolves over time as performance of this effect varies from time to time and consistent with AMH. Finally, the paper suggests AMH (Adaptive Market Hypothesis) is well elucidation of behavior of Monday effect than traditional EMH (Efficient Market Hypothesis).

Keywords. Monday Effect; Efficient Market Hypothesis; Adaptive Market Hypothesis

INTRODUCTION

Calendar effects cause variation in prices of securities in financial markets and these effects prevail in the prices on regular intervals or on a particular time during the calendar. The investigation of these seasonal effects opens a new window for investors and market actors to beat the markets. Various studies around the globe have investigated the calendar effects, for example, calendar anomalies in details are studied by Jacobs and Levy (1988) including days of the week effect, TOM effect, Holiday effect and month of the year effect. Kumar (2016) investigates the same in developing and developed economies. The current study investigates the Monday (day of the week) effect which states that Monday produces negative returns. Particularly, we examine whether Monday effect is persistent, vanished or adapt over time (1996-2015) for individual companies listed at PSX from top seven sectors of economy. We further perform a subsample analysis to investigate the behavior of calendar anomalies over time. The motivation for the study comes from the fact that Monday effect violates the basic assumption of EMH (Efficient Market Hypothesis). EMH states that every strategy is futile to earn abnormal returns as all type of information is already incorporated into the security prices, thus, no calendar effect persists and markets are efficient. But many studies are evident of market inefficiencies like (see, Halari, 2013; Hashmi, 2014; Shahid & Mehmood, 2015; Kumar, 2015, 2016) because returns are significantly higher or lower depending upon day of the month, especially in Pakistan. Similarly, Campbell et al. (1997) suggest the idea of "relative efficiency" which measures efficiency of the market from an all-or nothing condition to varying over time. Furthermore, their argument is supported by (Urquhart & McGroarty, 2014; Shahid & Sattar, 2017) who find market efficiency varies over the time and continuously induces new profitable opportunities and additionally supports AMH of (Lo, 2004).

Lo (2004) proposes AMH and states that calendar effect and market efficiency may co-exist as market participants capitalize on their self-interests and prone to making wrong judgments, learn from these mistakes and adapt. The learning induces innovations in market dynamics like bubbles, fear, trends and collapses. The basic implication of AMH reveals that market circumstances determines the success of trading strategies and these strategies arise or disappear during conducive conditions. The second important assumption states that market efficiency fluctuates over time and not an all-or-nothing condition. AMH of Lo (2004) has gained attraction of researches around the globe (Lim, 2007; Kim et al., 2011; Urquhart & Hudson, 2013; Hull &

McGroarty, 2014; Shahid et al., 2018. Shahid et al., 2019; Shahid et al., 2020; Singh et al., 2020) to incorporate the efficiency with inefficiencies of the markets.

The study adds to the existing knowledge in the following ways; To the best of our knowledge, the study is first of its nature which explores the time varying Monday effect in emerging stock market of south Asia under the umbrella of AMH. Secondly, we select the sample period which encompasses the most important crises (Asian Financial Crisis, Dotcom Crisis, Global Financial Crisis and European Sovereign Debt Crisis). Thirdly, to observe the time varying behavior of Monday effect, we divided our sample into different sub-samples of equal lengths. Finally, we investigate the time varying Monday effect by employing GARCH (1, 1) model which explores dynamic volatility in share prices. On the other hand, test statistic of Kruskal-Wallis model is used to capture the non-normal nature of equity returns. The outcomes of the study may be fruitful for all market actors (Investors, brokers, security organizations, portfolio investors) for conducive forecasting. Data of individual firms from top sectors of the economy listed at PSX are selected over the period from January, 1996 to December, 2015. Moreover, four sub-samples of five years length are employed to inspect the dynamic behavior of Monday anomaly. Each sub-sample bearing enough observations to generate reliable outcomes. The paper is structured as follows: review of the literature is displayed in Section 2; methodology and data description are provided in Section 3; empirical results are presented in Sections 4; section 5 concludes along with implications of the study.

REVIEW OF LITERATURE

Monday effect or day of the week anomaly reveals that returns from equity shares do not remain persistently equal during the whole week as equity returns fluctuate along with the week days. According to Ulussever et al., (2011), Monday-effect is most puzzling and prominent effect and gains attention of researchers, practitioners and academicians. Berument and Bogan (2011) explores that behavior of investors varies on different week days while prices are typically declined on Mondays. Maberly (1995) shows that academicians as well as financial experts were conscious of Monday or day of the week effect during 1920s. Kelly (1930) first documents day of the week effect in his book on investing, according to him worst day is Monday in equity exchanges for investments, similarly, Cross (1973) presents first academic paper and investigates S&P 500 index over a sample period of 1953 to 1970. He observes Monday produces -0.18 % returns while Friday produces 0.12 % mean average returns. Studies are evident of unequal mean returns during the week days.

However, a wide-ranging evidence of Monday effect are documented by (French, 1980; Gibbson & Hess, 1981; Keim & Stambaugh, 1984; Michael & Starks, 1986) and their studies exhibit highest-positive returns on Friday and lowest-negative returns on Monday. Similarly, (Lakonishok & Smidt, 1988; Abraham & Ikenberry, 1994; Wang et al., 1997) provide parallel evidences in equity markets of United States. Mills & Coutts (1995) find significant negative returns on Mondays for the FTSE 250 and 350 indices and negative but not significant returns for the FTSE100. Dubois and Louvet (1996) find low Monday returns in the FTSE All-Share and (Arsad & Coutts, n.d) document a negative Monday effect in the FT30 from year 1935 to 1994. Madureira and Leal (2001) report no Monday effect in Brazil. Bildik (2004) observes lowest returns on Mondays. Mustafa and Muhammad (2007) consider the period of December 1991 to December 2003 and find no significant Monday effect in KSE-100 Index of PSX (Pakistan stock exchange). Lian and Chen (2004) investigate the Asian countries over the years 1992 to 2002, they report stock exchanges of Malaysia, Singapore and Thailand show negative Monday-returns while positive-Wednesday and Friday returns, stock market of Indonesia exhibits positive returns on Friday while in Philippine stock returns are positive on Wednesday and Thursday. Basher and Sadorsky (2007) examine stock return in 21 countries over a sample period of 1992-2005. The results support Monday (as Monday exhibits negative returns) and positive Friday or weekend effect in all markets except Malaysia, Taiwan, Thailand and Turkey where findings reveal positive returns on Monday. With reference to investments patterns and size, Brusa et al. (2005) explore the Monday effect in S&P 500 index returns over the period of 1962 to 1988. They find lowest return on Monday. Haroon (2009) rejects the weak-form of EMH in Pakistan Stock Exchange (PSX) by providing the evidence of Monday effect. Cai et al., (2006) report negative Monday return in china.

Borges (2009) investigates the day-of-the-week in a group of 17 Central and Western European equity indices. On the basis of GARCH (1,1) model approach he finds a significant Monday effect (negative) while positive-significant Friday effects in Iceland and Greece. Furthermore, he reports highly instable calendar effects which cast doubts on their economic significance. In Amman Stock Exchange (ASE), negative Monday effect is found by (Alrabadi & Al-Qudah, 2012) over the era of years 2002-2011. It is also concluded that trends of price movements at ASE are based on presence of seasonal patterns. Monday is also evident of lowest returns in Latin America, while Friday induces highest-positive expected returns (Roderiguez, 2012). From Pakistan, Iqbal et al. (2013) employ OLS (Ordinary Least Square) regression on daily as well as weekly data over period of 1992 to 2011, and find Pakistan stock exchange (PSX) exhibit negative returns and positive returns on Monday and Friday respectively.

More recently Olson et al. (2015) find evolution and Long-run disappearance of calendar anomalies and they furthermore argue that these effects may disappear, then again rise but ultimately decline in the long-run. They utilize the data of daily return from AMEX index, DJIA-30 Index, NASDAQ-100 Index, S&P-500 index, S&P Mid-Cap-400 Index, and S&P Small-Cap-600 Index. By employing an array of Unit root test: ADF-test and KPSS tests, they observe a robust sign of disappearance in weekday effect in equity markets of U.S which is consistent with EMH. Shahid and Sattar (2017) investigate Pakistan stock exchange over the period of 1992 to 2015 and find Monday effect fluctuate over time and consistent with AMH.

Urquhart and McGroarty (2014), examine calendar effects (Monday, TOM, January & Halloween effect) over very longer historic data from 1900 to 2013 at DJIA. With the utilization of implied investment strategies and rolling window analysis they observe the presence of all anomalous effects which supports AMH as the success of these effects only preset in certain market conditions. It is also explored that AMH is best model to elaborate the behavior of calendar effects as compare to EMH. But (Urquhart & McGroarty, 2014) explore stock markets of emerged economies where stock exchanges well perform. Moreover, they investigate index data and ignored company wise returns series which offers different results. Thus, current study explores the Monday effect through firm level data from emerging economy which may portray different results. Similarly, anomalous effects have been studied by employing data of KSE-100 index by incorporating small sample sizes. For instance, using data of only 5 years, Shahid and Mehmood (2015) presents calendar anomalies through descriptive statistics. The same limitation is evident from the articles of (Husain, 1998; Ehsan, 2012) at PSX. Results of Mahmood and Rehman (2007) are based on only 8 individual firms which is insignificant measure of calendar effects. Thus, we make a space here by investigating 107 firms through AMH. The null Hypothesis is;

Ho: Monday anomaly fluctuates over time and exhibits episodes of predictability and no-predictability.

DATA AND METHODOLOGY

For detection of Monday anomaly along with its time varying behavior, we examine the daily time serios of returns from listed companies of PSX. Out of 560 listed firms, we select 107 companies of top seven sectors over the period from January 1, 1996 to December 31, 2015, because a large enough sample period is required to investigate the time varying volatility. As compared to use the data of national indices, it is more appropriate to utilize the data of individual firms to explore the time varying nature of Monday anomaly. Therefore, analysis would provide a true mark whether returns from equity investments are predictable for investors on Monday and whether the said anomaly entails episodic nature of predictability. The regression estimated in the study is as follows:

$$R_t = c + \beta D_t + \varepsilon_t, \qquad t = 1, \dots, T$$

Where R_t is the return of individual firm, D_t indicates Monday anomaly, while error term is given by ε_t. The existence of Monday effect at PSX is investigated by using GARCH (p, q) model instead of usual regression (OLS). From the family of volatility models, we use GARCH (1, 1) because of its simplicity, robustness and wide-ranging applicability in literature. This model "allow researchers to model variance as conditional on the past variance and error, rather than fixed through the series (Urquhart & McGroarty, 2014)". Hence, we employ the following GARCH (1, 1) model to uncover the time varying levels of returns from firms under study;

$$h_t = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \theta h_{t-1}$$

Where h_t and presents h_{t-1} present conditional variance at time t, and at time $t-1$ respectively. while α_0, α_1 & θ are the coefficients of GARCH model. Although GARCH model is suitable method and holds the inherent capability to uncover the volatility feature of stock returns but it does not suitable to detect the non-normality property of equity returns.

Table 1: Monday anomaly is presented through descriptive statistics for firms under study during the full-sample period while * show significance level at 1%.**

	Mean	Std. Deviation	t-statistic	W-statistic
Monday	-0.048	0.125	-7.828***	58.231***
Non-Monday	0.0513	0.0417		

Table 2: Mean Return on Mondays and non-Mondays for companies (individual) during complete sample era.

Anomaly	**Firms**	**Mean**	**Firms**	**Mean**	**Firms**	**Mean**	**Firms**	**Mean**
Monday	PK:ABB	-0.107	PK:DEG	-0.139	PK:JIN	0.006	PK:TLM	-0.173
Non-Monday		0.091		0.086		0.084		0.029
Monday	PK:ADI	-0.167	PK:ETU	0.038	PK:KIE	-0.063	PK:PTC	-0.08
Non-Monday		0.1		0.074		-0.012		0.102
Monday	PK:AGR	0.249	PK:ERO	-0.059	PK:KRM	-0.048	PK:PSM	-0.003
Non-Monday		0.028		0.076		0.019		-0.013

Monday	PK:AGT	0.055	PK:FSM	0.062	PK:KWG	-0.146	PK:LAK	0.125
Non-Monday		0.071		0.04		0.078		0.095
Monday	PK:ACB	-0.134	PK:FAU	-0.042	PK:KNR	0.21	PK:PCT	-0.083
Non-Monday		0.081		0.069		-0.003		0.077
Monday	PK:ATH	0.027	PK:FZM	0.25	PK:LDP	-0.051	PK:POC	-0.262
Non-Monday		0.12		-0.027		0.012		0.065
Monday	PK:ATR	0.003	PK:FEC	-0.109	PK:MLC	0.137	PK:RMP	-0.066
Non-Monday		0.06		0.056		0.003		0.114
Monday	PK:BKP	-0.186	PK:NAK	0.005	PK:MBK	-0.082	PK:RUP	-0.111
Non-Monday		0.081		0.024		0.108		-0.003
Monday	PK:BAP	0.043	PK:GAI	0.1	PK:MIR	0.1	PK:STM	-0.005
Non-Monday		0.101		0.011		0.017		-0.002
Monday	PK:BHA	0.01	PK:GTR	-0.031	PK:MRB	0.06	PK:CCB	-0.184
Non-Monday		0.046		0.084		0.096		-0.002
Monday	PK:BOC	0.007	PK:GWC	-0.443	PK:NAR	-0.062	PK:SAN	-0.025
Non-Monday		0.06		0.113		0.059		0.022
Monday	PK:CAL	-0.192	PK:GLT	-0.118	PK:NPK	0.046	PK:HPN	-0.073
Non-Monday		0.063		0.079		0.104		0.061
Monday	PK:CPB	-0.066	PK:GRY	-0.048	PK:NAT	-0.199	PK:SPP	0.125
Non-Monday		0.049		0.044		0.028		0.053
Monday	PK:CTC	-0.106	PK:GUL	0.022	PK:NHT	-0.124	PK:SAP	0.057
Non-Monday		0.068		0.044		0.104		0.045
Monday	PK:CSA	0.043	PK:GSM	-0.15	PK:NON	-0.003	PK:SEA	0.079
Non-Monday		0.041		0.011		0.044		0.088
Monday	PK:CTX	0.011	PK:HAB	-0.014	PK:ORI	-0.136	PK:SER	0.135
Non-Monday		0.005		0.053		0.057		0.03
Monday	PK:CYA	0.039	PK:MET	0.004	PK:PAC	-0.052	PK:SHA	-0.095
Non-Monday		0.067		0.075		0.068		0.062
Monday	PK:DAC	-0.431	PK:HSM	0.031	PK:PET	-0.149	PK:SCM	0.115
Non-Monday		0.076		0.049		0.103		-0.023
Monday	PK:DAE	-0.015	PK:HAE	-0.136	PK:PSM	0.076	PK:SHJ	0.035
Non-Monday		-0.004		0.054		0.066		0.019
Monday	PK:DAN	-0.173	PK:HPM	0.003	PK:PNC	0.058	PK:SHK	-0.101
Non-Monday		0.035		0.077		0.059		0.044
Monday	PK:DDH	-0.082	PK:HUB	-0.094	PK:PEN	-0.3	PK:PBS	-0.102
Non-Monday		0.101		0.06		0.159		0.064
Monday	PK:DAW	-0.065	PK:HUF	-0.08	PK:PAL	-0.159	PK:SIT	-0.036
Non-Monday		0.101		0.086		0.04		0.058
Monday	PK:DKT	-0.037	PK:ICI	-0.163	PK:PNS	0.07	PK:SON	-0.058
Non-Monday		-0.038		0.066		0.055		0.067
Monday	PK:DMT	-0.006	PK:IMO	0.133	PK:POF	-0.062	PK:SNG	-0.072
Non-Monday		-0.042		0.066		0.094		0.034
Monday	PK:DES	-0.096	PK:INI	-0.118	PK:PRE	0.083	PK:SUI	-0.047
Non-Monday		-0.041		0.096		0.013		0.043
Monday	PK:DSM	-0.048	PK:ASB	-0.548	PK:PSO	-0.042	PK:TRP	-0.123
Non-Monday		-0.033		0.1		0.051		0.001
Monday	PK:DEW	-0.016	PK:JAV	-0.223	PK:PSC	-0.017		
Non-Monday		-0.077		0.082		-0.005		

Thus, a non-parametric Kruskal-Wallis (K.W) is employed to investigate the identical distribution of the population from which sample for each firm is drawn. Therefore, we explore the mean difference in non-Monday and Mondays' return, so;

$$H = \left(\frac{12}{N\,(N+1)} \sum_{j=1}^{k} \frac{R_j^2}{n_j}\right) - 3(N+1)$$

Where for number of groups (k) total number of observations are represented by N. For jth group, average rank of observations and total number of observations are presented by R_j^2 and n_j respectively. Both the aforementioned tests are employed to detect and gauge the time variant behavior of Monday anomaly through full and sub-samples on 107 listed companies at Pakistan Stock Exchange (PSX). The data is split into 4, five

yearly sub-samples of equal length. Each sub-sample bearing enough observations to generate reliable outcomes of time varying nature of Monday anomaly.

Daily returns are calculated for the period (comprising 5219 observations) of January 1st, 1996 to December 31st, 2015 by employing formula given bellow;

$$r_t = [\ln(P_t) - \ln(P_{t-1})] \times 100$$

The $\ln(P_t)$ presents natural log of returns from individual companies at time t, on the other hand $\ln(P_{t-1})$ presents natural log of returns from individual companies at time $t-1$.

Empirical Results

Skewness, kurtosis and Jarque bera test are used to detect the normality of time series of 107 companies under study. All the tests indicate all return series of all companies are not normal during sub and full sample era. Results for normality are under the possession of authors which may be provided on request. Table 1 exhibits outcomes for Monday anomaly via full-sample era ranges from 1996 to 2015. Difference in mean returns on Mondays and non-Mondays is calculated using non-parametric Kruskal-Wallis test-statistic. We find negative mean return on Mondays while positive mean return on non-Mondays indicating the strong evidence of Monday effect. Similarly, the standard deviation of Mondays is greater than the standard deviation on non-Mondays, while both the Kruskal-Wallis statistics and standard t-statistics support a significant difference between Monday and non-Monday returns over the full sample period for all companies. The table 2 shows the mean return on Mondays and non-Mondays for individual companies over the period of full-sample. Table reveals that, 70 firms show lowest and negative mean return on Mondays, while positive mean return on non-Mondays indicating the strong evidence of Monday effect, while 18 firms show positive but low return on Mondays than non-Mondays. Hence, 82,3% firms support Monday effect.

Tables 3, 4 & 5 present the results of full and subsamples through GARCH (1,1) and K.W test. Results of full-sample address 44 firms possess negative and significant Monday effect over the period of 20 years comprising 1996 to 2015. The behavior indicates that the returns of these 44 firms are negative on Monday (as Monday effect claims that return is negative on Monday). Similarly, 44 firms generate negative but insignificant coefficient on Monday over the full-sample. However, a large majority of firms (44+44) exhibits Monday effect in Pakistan stock exchange in full-sample period. On the other hand, 19 firms show insignificant but positive Monday returns.

Table 3: Outcomes for Monday-Anomaly during sample periods (full and all sub periods) with the application and k.w test (Kruskal-Wallis) and a regression model (GARCH, 1,1). Outcomes are presented for firms listed at Pakistan stock market. The Monday-anomaly and non-Monday anomaly are represented by "β" and "c" respectively, while "N" presents total observations used in the study. Employed significant levels are denoted by *, ** and * for 1%, 5% and 10% respectively. Behavior of firms (PK;BAP, PK:BOC, PK:FSM, PK:GUL, PK:HAB, PK:SEA, and PK:SER) is displayed in Panel A , while behavior of firms (PK:ABB, PK:DAC, PK:FAU, PK:FZM, PK:FEC, PK:GLT, PK:MIR and PK:NAR) is displayed in Panel B.**

N	Period	Firms	c	β	K. w	Firms	c	β	K. w	Firms	c	β	K. w
Panel A													
5219	Full-Sample	PK:BAP	0.018 (0.511)	-0.0611 (-1.049)	0.1797	PK:GUL	0.0153 (0.412)	-0.0717 (-0.882)	0.9565	PK:SER	-0.1384** (-2.026)	0.1424 (1.39)	0.0556
1305	1996-2000		-0.0695 (-0.769)	0.0352 (0.337)	0.8904		-0.0364 (-0.781)	-0.0248 (-0.124)	0.6386		-0.0289 (-0.375)	-0.104 (-0.529)	1.6537
1305	2001-2005		0.096 (1.23)	-0.2666* (-1.822)	0.0357		0.1409* (1.866)	-0.2465* (-1.775)	1.4877		-0.4967*** (-4.842)	0.7387*** (4.173)	0.5784
1304	2006-2010		0.0577 (0.784)	0.0207 (0.122)	0.0984		-0.0502 (-0.408)	0.1356 (0.554)	0.1177		0.0564 (0.546)	-0.1293 (-0.6)	0.2847
1305	2011-2015		0 (-1.385)	0 (0.114)	0.0297		0.0383 (0.614)	-0.1329 (-1.094)	0.3979		0.0113 (0.215)	-0.0773 (-0.676)	0.0421
5219	Full-Sample	PK:BOC	0.0448 (0.985)	-0.1199 (-1.245)	0.1041	PK:HAB	-0.0074 (-0.186)	-0.0332 (-0.384)	0.5868				
1305	1996-2000		0.0601 (0.416)	-0.2938 (-1.026)	0.0004		-0.0104 (-0.111)	-0.2354 (-1.285)	0.0686				
1305	2001-2005		0.1 (1.378)	-0.2826** (-2.208)	0.1476		-0.1028 (-1.418)	0.4299** (2.543)	9.6498***				
1304	2006-2010		-0.0346 (-0.357)	-0.0746 (-0.405)	0.0148		0.1415 (1.43)	-0.4006* (-1.901)	3.6437*				
1305	2011-2015		-0.0104 (-0.203)	0.056 (0.513)	0.0001		-0.0168 (-0.244)	0.0099 (0.066)	1.3459				
5219	Full-Sample	PK:FSM	0.0201 (0.385)	-0.0781 (-0.598)	0.0001	PK:SEA	0.0406 (1.291)	0.0051 (0.08)	0.9994				
1305	1996-2000		-0.0276 (-0.156)	-0.1524 (-0.331)	0.6177		-0.124* (-1.671)	-0.0916 (-0.573)	0.0251				
1305	2001-2005		0.0465 (0.568)	0.3454*** (2.801)	0.2104		0.0817 (1.121)	0.2675* (1.782)	2.0551				
1304	2006-2010		-0.046*** (-5.728)	-0.0715 (-0.555)	0.2879		-0.046 (-0.658)	-0.0838 (-0.644)	0.1882				
1305	2011-		0.0604	-0.0673	1.4635		0.1174**	-0.0378	0.5879				

	2015		(0.944)	(-0.472)			(2.338)	(-0.367)					
Panel B													
5219	Full-Sample	PK:ABB	0.0668** (2.215)	-0.1852*** (-3.192)	4.5596**	PK:FZM	0.5614*** (18.051)	-0.6669*** (-5.663)	0.0613	PK:MIR	-0.0567 (-1.251)	0.129 (1.078)	0.422
1305	1996-2000		-0.0213 (-0.511)	-0.0002 (-0.002)	0.2964		0.4955*** (2.865)	-0.4526 (-0.36)	0.6968		-0.1215 (-1.07)	0.1248 (0.262)	0.582
1305	2001-2005		0.1217* (1.709)	-0.2097 (-1.39)	0.7268		-0.0248 (-0.333)	-0.0021 (-0.01)	0.5073		-0.1159 (-1.045)	0.1253 (0.35)	0.8005
1304	2006-2010		0.0446 (0.849)	-0.1846** (-2.104)	3.3067*		0.0148 (0.308)	0.7549*** (3690.983)	0.0008		-0.0427 (-0.312)	0.5616* (1.783)	3.7128*
1305	2011-2015		0.1407*** (2.776)	-0.1656* (-1.794)	0.3584		0.0253 (0.437)	-0.208* (-1.818)	0.0565		0.011 (0.174)	-0.1131 (-0.894)	0.8148
5219	Full-Sample	PK:DAC	0.0056 (0.973)	-0.0843*** (-3.385)	4.2389**	PK:FEC	0.024 (0.49)	-0.2563** (-2.333)	2.6929*	PK:NAR	0.0504 (1.194)	-0.1853** (-2.456)	1.0243
1305	1996-2000		-0.2546* (-1.64)	-0.1695 (-0.471)	0.2141		-0.316*** (-2.613)	-0.0374 (-0.13)	0		-0.1493* (-1.836)	0.0002 (0.001)	0.004
1305	2001-2005		0.1027 (0.688)	0.2025 (0.553)	1.1878		0.07 (0.562)	0.0687 (0.278)	0.0829		0.1563* (1.789)	0.0071 (0.05)	0.2147
1304	2006-2010		0.1021 (0.724)	-0.8859*** (-3.436)	6.7434***		0.0258 (0.352)	-0.5291*** (-3.498)	8.2709***		0.0458 (0.443)	-0.3428* (-1.626)	2.2211
1305	2011-2015		0.0002 (0.001)	-0.0155 (-0.099)	8.7987***		0.1875** (2.321)	-0.1939 (-1.12)	0.2812		0.0498 (1)	-0.134 (-1.373)	1.7139
5219	Full-Sample	PK:FAU	0.077*** (3.468)	-0.1395*** (-3.401)	3.647*	PK:GLT	0.0154 (0.566)	-0.1184** (-2.167)	3.4964*				
1305	1996-2000		0.0081 (0.121)	-0.1385 (-1.04)	0.808		-0.1128** (-2.015)	-0.1514 (-1.121)	1.5158				
1305	2001-2005		0.1082* (1.684)	-0.0943 (-0.821)	0.9397		0.035 (0.625)	0.0347 (0.328)	0.1341				
1304	2006-2010		0.1134*** (2.608)	-0.273*** (-3.265)	7.3505***		0.0704 (1.552)	-0.2464*** (-3.184)	2.9781*				
1305	2011-2015		0.0417 (1.468)	-0.0475 (-0.731)	2.6964*		0.0562 (1.155)	-0.0658 (-0.739)	0.5036				

Table 4: Outcomes for Monday-Anomaly during sample periods (full and all sub periods) with the application and k.w test (Kruskal-Wallis) and a regression model (GARCH, 1,1). Outcomes are presented for firms listed at Pakistan stock market. The Monday-anomaly and non-Monday anomaly are represented by "β" and "c" respectively, while "N" presents total observations used in the study. Employed significant levels are denoted by *, ** and * for 1%, 5% and 10% respectively. Behavior of firms (PK:CTX, PK:DAN, PK:DKT, PK:DEG, PK:ERO, PK:PAC, and PK:SNG) is displayed in Panel C, while behavior of firms (PK:AGR, PK:AGT, PK:ATR, PK:CPB, PK:CSA, PK:ETU, PK:MET, PK:IMO, PK:KNR, PK:MLC, PK:POF, PK:PRE, PK:SHJ) is displayed in Panel D.**

N	Period	Firms	c	β	K. w	Firms	c	β	K. w	Firms	c	β	K. w
Panel C						**Panel D**							
5219	Full-Sample	PK:CTX	0.0093 (0.198)	-0.0743 (-0.729)	0.0008	PK:AGR	0.0985** (2.523)	-0.1305* (-1.615)	0.0001	PK:IMO	0.0727** (2.308)	0.0125 (0.204)	0.3723
1305	1996-2000		-0.0029 (-0.017)	0.6879* (1.69)	0.6815		-0.2984* (-1.775)	0.5555 (1.384)	2.6321*		-0.1309 (-1.379)	0.2146 (1.07)	0.2373
1305	2001-2005		0.0249 (0.248)	0.1252 (0.616)	2.9762*		0.1635* (1.755)	0.4026** (2.265)	5.5787**		0.0397 (0.538)	0.4612*** (3.295)	10.39***
1304	2006-2010		-0.1382 (-1.55)	0.1886 (0.985)	1.248		0.0705 (0.949)	-0.2504* (-1.702)	2.2372		0.036 (0.563)	0.0457 (0.379)	0.084
1305	2011-2015		0.0807 (1.035)	-0.497*** (-2.962)	7.5088***		0.0732 (1.452)	-0.2392** (-2.208)	3.8148**		0.1381*** (2.964)	-0.2721*** (-2.858)	2.8808*
5219	Full-Sample	PK:DAN	0.0014 (0.018)	-0.2055 (-1.281)	2.1353	PK:AGT	0.0399 (1.159)	-0.132** (-2.095)	0.0197	PK:KNR	-0.0274 (-0.458)	0.1898 (1.489)	0.5062

1305	1996-2000		0.101*** (60.397)	-1.309*** (-191.77)	2.4407		-0.014 (-0.161)	-0.2698* (-1.627)	0.0404		-0.3027* (-1.776)	0.6033* (1.734)	2.1996
1305	2001-2005		-0.1572 (-0.92)	0.4177 (1.224)	2.1389		-0.003 (-0.042)	0.3277** (2.186)	8.1039***		0.0818 (0.684)	0.6569*** (2.602)	4.0377**
1304	2006-2010		-0.0726 (-0.65)	0.0734 (0.365)	0.2931		0.0488 (1.14)	-0.0901 (-1.032)	1.226		-0.1314 (-1.518)	-0.1564 (-0.836)	0.6492
1305	2011-2015		0.2164 (1.433)	-0.6975** (-2.369)	9.6657***		0.0477 (0.959)	-0.1985** (-2.138)	5.0857**		0.2134** (2.47)	-0.3996** (-2.266)	0.7781
5219	Full-Sample	PK:DKT	-0.0768 (-0.721)	-0.0916 (-0.413)	1.7137	PK:ATR	0.0264 (0.691)	-0.0462 (-0.693)	2.2161	PK:MLC	0.1001** (1.959)	-0.1842* (-1.923)	0.3321
1305	1996-2000		-0.214*** (-17.243)	0.2038* (1.648)	6.5673***		-0.0703 (-0.966)	0.0926 (0.674)	0.7256		-0.1486 (-1.199)	-0.2444 (-1.021)	0.1661
1305	2001-2005		-0.0472 (-0.265)	0.1815 (0.595)	1.0864		-0.0503 (-0.594)	0.4114** (2.015)	1.6737		0.0553 (0.442)	0.3845* (1.752)	8.886***
1304	2006-2010		-0.3083 (-0.69)	0.0026 (0.002)	0.0079		0.1096 (1.068)	-0.3129* (-1.645)	0.5802		-0.0195 (-0.21)	-0.207 (-1.206)	0.0004
1305	2011-2015		0.143 (0.909)	-0.827* (-	0.7883		0.1102**	-0.3146	7.4506***		0.2239***	-0.3082** (-2.297)	1.7927

				1.878)			(1.967)	*** (-2.978)			(2.933)		
5219	Full-Sample	PK:DEG	0.151*** (3.75)	-0.298*** (-4.068)	4.6945**	PK:CPB	0.052 (1.257)	-0.212** (-2.438)	4.0669**	PK:POF	0.0907*** (3.198)	-0.1438** (-2.394)	10.86***
1305	1996-2000		-0.1342 (-1.153)	-0.3767* (-1.805)	0.1342		-0.0911 (-0.796)	-0.1011 (-0.417)	0.383		-0.0396 (-0.805)	-0.0366 (-0.294)	0.0457
1305	2001-2005		0.1875** (2.193)	0.0078 (0.048)	0.5968		0.0734 (0.84)	0.3374* (1.889)	3.6727*		0.0397 (0.622)	0.2337** (1.953)	0.0938
1304	2006-2010		0.1434* (1.789)	-0.229* (-1.663)	2.6673*		-0.0242 (-0.374)	-0.1488 (-1.146)	3.3479*		0.1733** (2.442)	-0.2517* (-1.819)	6.578***
1305	2011-2015		0.1949*** (3.456)	-0.432*** (-4.08)	5.5662**		0.1418** (2.066)	-0.4353*** (-3.153)	3.7848*		0.0838** (2.216)	-0.2964*** (-4.081)	9.557***
5219	Full-Sample	PK:ERO	0.1031*** (3.572)	-0.1328** (-2.399)	2.7851*	PK:CSA	0.0625 (1.41)	-0.1555* (-1.943)	5.5184**	PK:PRE	-0.0223 (-0.583)	-0.008 (-0.098)	0.2525
1305	1996-2000		0.1083* (1.647)	-0.371*** (-3.216)	2.1762		-0.1584* (-1.642)	-0.2249 (-1.454)	0.1682		-0.2658*** (-3.046)	0.2508 (1.226)	11.88***
1305	2001-2005		0.0249 (0.535)	0.1507*	0.3827		0.0967	0.3928*	1.4181		0.0062 (0.09)	0.4271** (2.523)	5.6333**

				(1.746)			(0.972)	(1.935)					
1304	2006-2010		0.1422** (2.244)	-0.1352 (-1.111)	0.4098		-0.0228 (-0.217)	-0.1367 (-0.596)	0.843		0.0084 (0.136)	-0.0306 (-0.243)	0.0926
1305	2011-2015		0.1155** (1.984)	-0.2662** (-2.393)	3.5622*		0.1253** (2.257)	-0.4251*** (-3.622)	16.151***		0.0461 (0.748)	-0.4313*** (-3.75)	4.8748**
5219	Full-Sample	PK:PAC	0.0513 (1.313)	-0.0976 (-1.077)	1.0234	PK:ETU	0.0581* (1.629)	-0.0582 (-0.857)	0.0361	PK:SHJ	-0.0212 (-0.689)	-0.0304 (-0.53)	0.0223
1305	1996-2000		-0.066*** (-23.02)	-0.535*** (-51299.9)	0.0018		-0.0742 (-1.077)	-0.1058 (-0.615)	0.0315		0.0077 (0.145)	-0.0363 (-0.38)	0.0142
1305	2001-2005		0.1115** (2.413)	-0.0214 (-0.193)	2.6576*		0.0608 (0.718)	0.3666** (2.357)	5.8418**		0.0165 (0.327)	0.1919* (1.704)	1.1578
1304	2006-2010		0.0276 (0.362)	-0.0346 (-0.227)	0.6632		0.1141* (1.641)	-0.0273 (-0.213)	0.0379		-0.0718 (-0.895)	0.1418 (0.879)	1.0609
1305	2011-2015		0.1068** (1.952)	-0.335*** (-3.172)	4.894**		0.0552 (0.991)	-0.3168*** (-3.048)	4.722**		-0.0051 (-0.072)	-0.2501** (-1.996)	1.9562
5219	Full-Sample	PK:SNG	0.0198 (0.531)	-0.0602 (-0.945)	2.1236	PK:MET	0.083*** (2.631	-0.073 (-1.129)	0.6176				

							)						
1305	1996-2000		-0.0972 (-1.151)	0.3184** (2.146)	1.7883		-0.0216 (-0.31)	0.0744 (0.44)	0.8808				
1305	2001-2005		0.0717 (0.804)	-0.0312 (-0.192)	0.2677		0.1341** (2.03)	0.2538* (1.742)	3.2211*				
1304	2006-2010		-0.0277 (-0.376)	0.034 (0.293)	0.1772		0.0557 (0.965)	-0.0267 (-0.234)	0.1456				
1305	2011-2015		0.0758 (1.28)	-0.360*** (-3.326)	4.7682**		0.0874* (1.77)	-0.3583*** (-3.696)	6.7116***				

As we talk about analysis of sub-periods, the coefficients of Monday anomaly are insignificant (independent) in first sub-sample (1996-2000) for the companies PK;BAP, PK:BOC, PK:FSM, PK:GUL, PK:HAB, PK:SEA, and PK:SER. The Monday effect then turns to dependency (market inefficiency) during period (2001-2005) for these companies as the coefficients are significant. The behavior of Monday effect then reverses and turns to independence and market becomes efficient for the companies in next two sub-samples (from 2006-2010 to 2011-2015), thus favoring AMH (see panel A of table-3). The firms PK:ABB, PK:DAC, PK:FAU, PK:FZM, PK:FEC, PK:GLT, PK:MIR and PK:NAR show independency of Monday anomaly for two consecutive sub-periods from 1996 to 2005. After that a reversal in behavior takes places during sub-period 2006 to 2010 which mark a sign of market inefficiency. Again, market becomes efficient for Monday anomaly for last sub-sample (see panel B of Table-3), hence, favoring AMH.

Monday effect is significant in firms PK:CTX, PK:DAN, PK:DKT, PK:DEG, PK:ERO, PK:PAC, and PK:SNG in first sample-period (1996-2000), the behavior then reverses and becomes insignificant (market become efficient) in the next two consecutive sub-samples (2001-2005 and 2010-2015). Finally, in the last subsample the Monday effect for the firms generates significant coefficients, thus supporting AMH (see table 4 panel C). Similarly, firms PK:AGR, PK:AGT, PK:ATR, PK:CPB, PK:CSA, PK:ETU, PK:MET, PK:IMO, PK:KNR, PK:MLC, PK:POF, PK:PRE, PK:SHJ show insignificant Monday effect in the first sub-sample (1996-2000), while the behavior of Monday effect reverses in the next sub-sample and becomes dependent during 2001-2005.

Table 5: Outcomes for Monday-Anomaly during sample periods (full and all sub periods) with the application and k.w test (Kruskal-Wallis) and a regression model (GARCH, 1,1). Outcomes are presented for firms listed at Pakistan stock market. The Monday-anomaly and non-Monday anomaly are represented by "β" and "c" respectively, while "N" presents total observations used in the study. Employed significant levels are denoted by *, ** and * for 1%, 5% and 10% respectively. Behavior of firms (PK:ACB, PK:BKP, PK:GTR and PK:PCT) is displayed in Panel E, behavior of firms (PK:GRY, PK:LAK, PK:HPN and PK:PSC) is displayed in Panel F, while behavior of firms (PK:CAL, PK:CTC, PK:JIN and PK:PAL) is displayed in Panel G.**

N	Period	Firms	c	β	K. w	Firms	c	β	K. w	Firms	c	β	
		Panel E				**Panel F**				**Panel G**			
5219	Full-Sample	PK:ACB	0.1312*** (3.934)	-0.2252*** (-3.94)	3.8984**	PK:GRY	-0.0297 (-0.613)	-0.0977 (-1.199)	0.8725	PK:CAL	0.0379 (0.297)	-0.3819* (-1.831)	1.5426
1305	1996-2000		0.0063 (0.067)	-0.3117** (-2.055)	0.1426		-0.0727 (-1.583)	0.2459*** (3.121)	2.0023		0.1271 (1.067)	-1.099*** (-7.733)	0.0014
1305	2001-2005		0.1834*** (2.731)	-0.0462 (-0.439)	0.1362		0.0434 (0.615)	-0.1493 (-0.613)	0.0402		0.0718 (0.173)	-0.5864 (-0.609)	0.6336
1304	2006-2010		0.1211** (2.054)	-0.3308*** (-3.251)	2.5682*		-0.0963 (-0.654)	-0.149 (-0.459)	0.258		-0.0402 (-0.192)	-0.7354* (-1.83)	4.2273**
1305	2011-2015		0.1261** (2.204)	-0.3143*** (-2.953)	4.1662**		-0.0749 (-0.712)	-0.0459 (-0.214)	0.4112		0.1463 (0.523)	0.0518 (0.076)	1.5722
5219	Full-Sample	PK:BKP	0.1263*** (2.954)	-0.3188*** (-4.434)	9.7725***	PK:LAK	0.0644** (2.13)	0.0003 (0.005)	0.111	PK:CTC	0.0521 (1.307)	-0.1201 (-1.525)	1.6825
1305	1996-2000		-0.0011 (-0.007)	-0.517*** (-2.543)	2.3161		-0.0262 (-0.212)	0.4121** (2.102)	0.2342		-0.0914 (-0.872)	-0.449** (-2.124)	2.9433*
1305	2001-2005		0.1421* (1.679)	0.1505 (0.875)	0.5674		0.0659 (0.877)	0.218 (1.404)	2.5995*		0.0093 (0.119)	0.386*** (2.726)	2.9739*
1304	2006-2010		0.1721*** (2.667)	-0.3506*** (-2.891)	6.5317***		0.085 (1.174)	0.0787 (0.525)	1.1086		-0.0169 (-0.243)	-0.0978 (-0.73)	0.1166
1305	2011-2015		0.0803 (1.026)	-0.409*** (-3.041)	5.3784**		0.0059 (0.117)	0.0549 (0.631)	0.0047		0.2129*** (3.133)	-0.2925** (-2.154)	4.4408**
5219	Full-Sample	PK:GTR	0.0083 (0.214)	-0.1037 (-1.378)	2.0575	PK:HPN	0.0538 (1.142)	-0.0805 (-0.786)	0.0074	PK:JIN	-0.0893** (-2.391)	-0.2025** (-2.175)	3.6252*
1305	1996-2000		-0.248*** (-2.69)	0.3554* (1.904)	2.2771		0.0816 (0.419)	-0.8309** (-1.972)	0.244		0.0071 (0.098)	-0.0745 (-0.394)	0.4393
1305	2001-2005		-0.0256 (-0.294)	0.19 (1.145)	1.2809		0.1228* (1.825)	-0.1034 (-0.592)	2.646*		-0.3513***	-0.4958** (-2.369)	0.3188

											(-3.561)		
1304	2006-2010		-0.0137 (-0.231)	-0.2551** (-2.35)	4.757**		-0.0747 (-0.884)	0.0108 (0.063)	0.1531		0.0568 (1.006)	-0.3299** (-2.537)	5.1658**
1305	2011-2015		0.1498** (2.296)	-0.3387** (-2.549)	4.8693**		-0.0062 (-0.099)	0.0115 (0.086)	0.4777		0.0781 (1.507)	-0.1035 (-0.947)	2.2303
5219	Full-Sample	PK:PCT	0.1506*** (2.953)	-0.3574*** (-3.776)	3.1198*	PK:PSC	0.0091 (0.189)	-0.1207 (-1.169)	0.0079	PK:PAL	0.0082 (0.155)	-0.185* (-1.88)	2.5364
1305	1996-2000		-0.1762 (-1.091)	-0.4864* (-1.606)	1.1017		-0.0391 (-0.345)	-0.4614** (-1.988)	2.9333*		0.0042 (0.034)	-0.3171 (-1.309)	1.7114
1305	2001-2005		0.1187 (0.866)	0.2258 (0.798)	4.6972**		-0.0076 (-0.084)	0.1132 (0.562)	0.8349		-0.1451 (-1.369)	0.7337*** (3.723)	7.5746***
1304	2006-2010		0.0906 (1.226)	-0.4375*** (-3.328)	12.6655***		-0.1153 (-0.849)	-0.1875 (-0.669)	0.8611		-0.0151 (-0.167)	-0.6589*** (-3.503)	9.0249***
1305	2011-2015		0.2008*** (2.805)	-0.292** (-2.002)	1.6294		0.0123 (0.211)	-0.0927 (-0.729)	0.1607		0.134 (1.26)	-0.3683* (-1.832)	0.855

The sub-sample 2006-2010 reveals a complete reversal of Monday effect which prevails in sub-period (2001-20005), then again turns to significant Monday effect in the last sub-sample (2011-2015) and supporting AMH (see table 4 panel D). Coefficients of Monday effect are significant (dependent) in first sub-sample (1996-2000) for the companies PK:ACB, PK:BKP, PK:GTR and PK:PCT. The Monday effect then turns to independency (insignificant) during period (2001-2005) for these companies as the coefficients are insignificant. The behavior of Monday effect then reverses and turns to dependence and market becomes inefficient for the companies in next two sub-samples (from 2006-2010 to 2011-2015), thus supporting AMH (see table 5 panel E). Contrary to this behavior, firms PK:GRY, PK:LAK, PK:HPN and PK:PSC produce substantial Monday anomaly during years 1996-2000 (first sub-sample) and all other sub-samples generate insignificant Monday anomaly thus favoring the AMH (see table 5 panel F). Also firms PK:CAL, PK:CTC, PK:JIN and PK:PAL depict behavior and supporting AMH (see table 5 panel G).

Monday effect in firms PK:ADI, PK:ASB, PK:CCB, PK:CYA, PK:DDH, PK:DES, PK:GWC, PK:HUF, PK:ICI, PK:INI, PK:KWG, PK:MBK, PK:NPK, PK:NAT, PK:NHT, PK:PET, PK:PNS, PK:POC, PK:SHA, PK:SHK, PK:PBS remain insignificant (independent) in first three subsamples (from years 19996-2010) and revert, predictable and moving towards dependency (market inefficiency) in last sub-sample (2011-2015) and supporting AMH (see table 6), while firms PK:HAE, PK:KIE and PK:ORI, PK:SON, PK:SUI, PK:TLM, and PK:TRP display the same behavior (see table 7). Therefore, 75 firms (70% of the sample size) show behavior of Monday effect consistent with AMH, means Monday effect fluctuate over time and goes under episodes of dependencies and independencies thus Ho is accepted that Monday anomaly fluctuates over time and exhibits episodes of predictability and no-predictability. On the other hand Monday effect in firms remains independent and does not evolve over time as all the sub-samples produce insignificant coefficients (results for the firms producing insignificant Monday effect are not reported but the results may be provided on demand).

CONCLUSION

Although, the recent studies support the fact that calendar anomalies have reversed or even diminished over time. But the voluminous literature is evident of the fact that calendar anomalies are accepted in almost all equity markets of world. The paper examines Monday-effect over time to explore whether this anomaly can be used to exploit the excess returns. The study finds 82.3% firms exhibit negative average returns on Mondays thus, supporting presence of Monday effect through average returns and GARCH (1,1) model in full-sample period of 1996-2015. Hence, the Monday anomaly can be used to exploit the unexpected returns. Finally, it is clear from sub-sample analysis, Monday-effect in 75 firms has shifted from periods of predictability/market inefficiency to the periods of no-predictability/market efficiency or vice versa, while 32 firms exhibit no swing in Monday effect during sub-samples. As the majority of firms go under episodes of predictability and no-predictability thus, we conclude that AMH provides a better description of behavior of stock returns and Monday effect in Pakistan than the classical/Traditional EMH and PSX is an adaptive market.

In summary, we conclude that Monday effect in firms' exhibits time varying behavior over time through sub-samples. The sign of varying behavior of Monday effect is consistent and supporting AMH while opposing to traditional EMH. We believe a sub-sample analysis of long time period may be a more appropriate method to elucidate the idea of Adaptive market hypothesis (AMH) in future research and suggest the current method could be adopted and helpful to examine other calendar and market anomalies in different equity markets in the world and we rest it for upcoming research.

Table 6: Outcomes for Monday-Anomaly during sample periods (full and all sub periods) with the application and k.w test (Kruskal-Wallis) and a regression model (GARCH, 1,1). Outcomes are presented for firms listed at Pakistan stock market. The Monday-anomaly and non-Monday anomaly are represented by "β" and "c" respectively, while "N" presents total observations used in the study. Employed significant levels are denoted by *, ** and * for 1%, 5% and 10% respectively. The table shows behavior of firm (PK:ADI, PK:ASB, PK:CCB, PK:CYA, PK:DDH, PK:DES, PK:GWC, PK:HUF, PK:ICI, PK:INI, PK:KWG, PK:MBK, PK:NPK, PK:NAT, PK:NHT, PK:PET, PK:PNS, PK:POC, PK:SHA, PK:SHK, PK:PBS).**

N	Period	Firms	c	β	K. w	Firms	c	β	K. w	Firms	c	β	K. w
5219	Full-Sample	PK:ADI	0.1174*** (2.949)	-0.195*** (-2.615)	6.9656***	PK:HUF	0.1086** (2.066)	-0.3985*** (-3.849)	8.868***	PK:NHT	0.0692* (1.606)	-0.2042** (-2.522)	2.3289
1305	1996-2000		-0.038 (-0.411)	0.0177 (0.115)	0.1357		-0.036 (-0.153)	-0.2682 (-0.516)	1.8728		0.048 (0.388)	-0.3142 (-1.281)	1.1929
1305	2001-2005		0.1411 (1.557)	0.0258 (0.153)	0.7223		-0.0801 (-0.395)	0.5589 (1.159)	1.1998		0.1617** (1.978)	0.0489 (0.322)	0.1955
1304	2006-2010		0.2223** (2.522)	-0.2053 (-1.164)	1.639		0.0112 (0.158)	-0.1893 (-1.266)	2.276		0.0165 (0.199)	-0.2577* (-1.701)	0.4641
1305	2011-2015		0.1219** (2.238)	-0.4255*** (-3.977)	9.1145***		0.0381 (0.55)	-0.6125*** (-4.198)	13.9853***		0.1215* (1.937)	-0.367*** (-2.998)	4.7166**
5219	Full-Sample	PK:ASB	-0.0459 (-0.465)	-0.5579** (-2.322)	7.651***	PK:ICI	0.0616 (1.497)	-0.2199*** (-3.057)	3.8359**	PK:PET	0.1263** (2.364)	-0.308*** (-2.897)	3.1852*
1305	1996-2000		-0.2693 (-1.448)	-0.2855 (-0.729)	2.3816		-0.0694 (-0.663)	-0.1283 (-0.695)	0.0144		-0.2565* (-1.77)	-0.2041 (-0.744)	0.6406
1305	2001-2005		0.08 (0.328)	-0.4068 (-0.737)	0.081		0.0627 (1.017)	0.0029 (0.021)	0.1875		0.2901* (1.809)	-0.2742 (-0.855)	0.0013
1304	2006-2010		-0.3685** (-2.128)	0.0668 (0.168)	0.3044		0.16* (1.812)	-0.3246* (-1.875)	0.9153		-0.0221 (-0.331)	-0.0066 (-0.049)	0.003
1305	2011-2015		0.1899 (1.288)	-1.3343*** (-4.18)	8.5808***		0.1185*** (38.954)	-0.4624*** (-132.003)	14.5796***		0.1998*** (2.597)	-0.5854*** (-4.005)	7.4818***
5219	Full-Sample	PK:CCB	0.0298 (0.449)	-0.32** (-2.477)	1.1331	PK:INI	0.0073 (0.275)	-0.1197** (-2.124)	9.1332***	PK:PNS	0.0479 (0.993)	-0.1389 (-1.41)	0.093
130	1996-		-0.1245	-0.381	0.6627		-0.0462	-0.0926	0.6862		-0.2279*	0.3757	2.8364*

5	2000		(-0.81)	(-1.277)			(-0.796)	(-0.616)			(-1.609)	(1.005)	
1305	2001-2005		-0.1328 (-1.003)	0.6795*** (2.724)	7.0049***		0.0317 (0.531)	0.0755 (0.567)	3.4906*		0.2371* (1.951)	0.1758 (0.755)	0.4345
1304	2006-2010		0.0812 (0.851)	-0.4175** (-2.148)	2.297		0.0708 (1.326)	-0.1329 (-1.477)	0.5247		-0.1092 (-1.432)	0.1067 (0.733)	0.1375
1305	2011-2015		0.2708*** (3.198)	-1.6673*** (-4782.058)	2.7313*		0.0208 (0.386)	-0.2858*** (-2.823)	6.3813**		0.0209 (0.313)	-0.3241** (-2.488)	0.9322
5219	Full-Sample	PK:CYA	0.0381 (0.814)	0.0129 (0.12)	0.4566	PK:KWG	0.0233 (0.45)	-0.0576 (-0.497)	0.0005	PK:POC	0.0411 (0.662)	-0.3968*** (-3.204)	6.9873***
1305	1996-2000		-0.0363 (-0.174)	0.141 (0.321)	0.0217		0.0342 (0.227)	0.338 (0.972)	1.347		-0.2883* (-1.901)	0.0753 (0.215)	0.3955
1305	2001-2005		0.0588 (0.666)	-0.1318 (-0.53)	1.5345		0.0407 (0.509)	0.0945 (0.688)	1.4553		0.05 (0.382)	0.1214 (0.435)	0.5068
1304	2006-2010		-0.1016 (-1.365)	0.0779 (0.517)	0.1634		-0.2461*** (-2.551)	0.1597 (0.791)	0.0039		0.023 (0.219)	-0.3854* (-1.944)	8.0693***
1305	2011-2015		0.3334*** (5.151)	-0.382*** (-2.761)	0.6337		0.1703 (1.545)	-0.6189** (-2.469)	1.7846		0.1627* (1.815)	-0.8286*** (-4.717)	5.1304**
5219	Full-Sample	PK:DDH	0.118*** (3.324)	-0.2148*** (-2.928)	5.4159**	PK:MBK	0.1627*** (4.533)	-0.2227*** (-3.589)	6.5317***	PK:SHA	0.0018 (0.041)	-0.0678 (-0.739)	4.1798**
1305	1996-2000		0.1398* (1.786)	-0.1067 (-0.61)	3.0321*		-0.0072 (-0.077)	-0.0722 (-0.437)	0.3618		-0.0098 (-0.109)	0.034 (0.175)	0.9747
1305	2001-2005		0.1315* (1.848)	-0.2275 (-1.559)	0.2488		0.1593** (1.963)	-0.0052 (-0.035)	0.0364		0.1342 (1.311)	-0.1806 (-0.849)	1.3887
1304	2006-2010		0.0226 (0.372)	-0.053 (-0.425)	0.4066		0.2706*** (3.446)	-0.1525 (-1.042)	3.8098**		-0.1037* (-1.742)	0.0872 (0.629)	2.2462

1305	2011-2015		0.0849 (1.32)	-0.3184*** (-2.644)	4.9087**		0.1332*** (3.006)	-0.3287*** (-3.835)	7.2641***		0.1219 (1.286)	-0.6639*** (-3.191)	10.4201***
5219	Full-Sample	PK:DES	-0.0331 (-0.59)	-0.0646 (-0.624)	0.5488	PK:NPK	0.0683*** (2.665)	-0.0747 (-1.283)	3.8633**	PK:SHK	0.0024 (0.046)	-0.0712 (-0.523)	1.1941
1305	1996-2000		-0.1047 (-0.915)	0.0839 (0.385)	1.0486		0.0397 (0.942)	-0.0175 (-0.168)	0.0636		-0.0925 (-0.887)	0.2067 (0.936)	0.9854
1305	2001-2005		-0.0093 (-0.11)	0.1983 (1.292)	2.004		0.0454 (0.564)	0.2938 (1.586)	0.3707		0.0933 (0.756)	-0.024 (-0.069)	0.0093
1304	2006-2010		-0.1263 (-0.932)	-0.254 (-1.056)	0.4636		-0.0048 (-0.086)	-0.0389 (-0.313)	0.6897		-0.1758* (-1.884)	0.1489 (0.692)	0.789
1305	2011-2015		0.0357 (0.333)	-0.45** (-2.147)	4.4073**		0.0753 (1.443)	-0.241** (-2.246)	5.3903**		0.1013 (1.167)	-0.6013*** (-3.06)	6.3405**
5219	Full-Sample	PK:GWC	-0.0922 (-1.305)	-0.2228 (-1.436)	4.7179**	PK:NAT	0.0252 (0.565)	-0.2826*** (-3.025)	10.1476***	PK:PBS	0.0596** (2.257)	-0.1335*** (-2.585)	2.4021
1305	1996-2000		-0.322*** (-2.787)	-0.159 (-0.566)	2.9044*		-0.1539 (-1.428)	-0.3553 (-1.504)	1.3781		0.0582 (0.955)	-0.105 (-0.829)	1.4806
1305	2001-2005		-0.3394 (-1.484)	0.0311 (0.059)	0.1588		-0.0037 (-0.039)	0.2508 (1.249)	0.8703		0.0604 (1.124)	-0.0597 (-0.544)	0.2951
1304	2006-2010		0.0276 (0.307)	-0.0782 (-0.476)	2.2822		0.0184 (0.209)	-0.2545 (-1.477)	3.4831*		0.0689 (1.358)	-0.0831 (-0.951)	0.0084
1305	2011-2015		0.2266** (2.286)	-0.5407** (-2.492)	4.9946**		0.1036 (1.255)	-0.7022*** (-4.29)	7.8783***		0.0471 (1.158)	-0.2734*** (-3.163)	6.8262***

Table 7: Outcomes for Monday-Anomaly during sample periods (full and all sub periods) with the application and k.w test (Kruskal-Wallis) and a regression model (GARCH, 1,1). Outcomes are presented for firms listed at Pakistan stock market. The Monday-anomaly and non-Monday anomaly are represented by "β" and "c" respectively, while "N" presents total observations used in the study. Employed significant levels are denoted by *, ** and * for 1%, 5% and 10% respectively. The table shows behavior of firm (PK:HAE, PK:KIE and PK:ORI, PK:SON, PK:SUI, PK:TLM, and PK:TRP)**

N	Period	Firms	c	β	K.w	Firms	c	β	K.w	Firms	c	β	K.w
5219	Full-Sample	PK:SON	0.0611 (1.553)	-0.0912 (-1.186)	4.1724**	PK:TLM	0.0045 (0.14)	-0.1102* (-1.713)	7.088***	PK:HAE	-0.0498 (-0.686)	-0.0944 (-0.45)	5.0169**
1305	1996-2000		-0.0352 (-0.456)	0.1702 (1.041)	0.3138		-0.0319 (-0.352)	-0.1103 (-0.666)	0.7711		-0.0803 (-0.355)	-0.1591 (-0.169)	0.1257
1305	2001-2005		0.1774*** (2.716)	0.1959 (1.591)	2.3519		-0.0089 (-0.168)	0.078 (0.693)	0.1345		-0.1218 (-0.57)	0.1681 (0.431)	0.3146
1304	2006-2010		0.0135 (0.148)	-0.1184 (-0.615)	0.8564		0.0593 (0.924)	-0.2486** (-2.107)	2.9134*		0.0975 (0.449)	-0.2131 (-0.301)	0.3252
1305	2011-2015		0.1047 (1.574)	-0.5012*** (-4.233)	15.6357***		0.0205 (0.399)	-0.2599** (-2.241)	2.9775*		0.0059 (0.058)	-0.595*** (-2.767)	4.0587**
5219	Full-Sample	PK:SUI	0.0509 (1.349)	-0.0757 (-1.007)	1.1517	PK:TRP	-0.0407 (-0.355)	-0.1891 (-0.66)	0	PK:KIE	-0.0031 (-0.059)	-0.1443 (-1.54)	0.8995
1305	1996-2000		-0.0163 (-0.178)	-0.0534 (-0.299)	0.1111		-0.3476 (-1.468)	-0.2236 (-0.334)	0		-0.1588 (-1.454)	0.0894 (0.465)	2.5687*
1305	2001-2005		0.0306 (0.406)	0.0921 (0.594)	0.0003		-0.0025 (-0.011)	0.0206 (0.036)	0		-0.1118 (-1.102)	0.4471** (2.505)	0.7454
1304	2006-2010		-0.0211 (-0.253)	0.0285 (0.179)	0.097		0.075 (0.27)	0.5105 (0.848)	0		-0.0152 (-	-0.5935*** (-2.894)	5.4357**

											0.132)		
1305	2011-2015		0.1267** (2.134)	-0.2765** (-2.405)	2.6052*		0.1327 (0.633)	-1.028** (-2.415)	0		0.1392 (1.535)	-0.4065*** (-2.592)	3.1932*
5219	Full-Sample	PK:ORI	0.0389 (1.06)	-0.1653** (-2.288)	4.733**								
1305	1996-2000		-0.0665 (-0.848)	-0.0668 (-0.429)	1.0491								
1305	2001-2005		0.0284 (0.272)	0.0416 (0.193)	0.0233								
1304	2006-2010		-0.002 (-0.029)	-0.2749** (-1.981)	0.9039								
1305	2011-2015		0.2064*** (2.853)	-0.4705*** (-3.168)	3.5048*								

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Appendix 1: The information of sample firms from Top Seven sectors

ABBOTT LABS.(PAK.)	PK:ABB	JUBILLE INSURANCE	PK:JIN
ADAMJEE INSURANCE	PK:ADI	KARACHI ELECTRIC SUPP.	PK:KIE
AGRIAUTO INDUSTRIES	PK:AGR	KARAM CERAMICS	PK:KRM
AL-GHAZI TRACTORS	PK:AGT	KOHINOOR MILLS	PK:KWG
ASKARI BANK	PK:ACB	KOHINOOR TEX.MILLS	PK:KNR
ATLAS HONDA	PK:ATH	LINDE PAKISTAN	PK:LDP
ATTOCK REFINERY	PK:ATR	MAPLE LEAF CMT.FACTORY	PK:MLC
BANK OF PUNJAB	PK:BKP	MCB BANK	PK:MBK
BATA PAKISTAN (~PR) (#T)	PK:BAP	MIRPURKHAS SUGAR	PK:MIR
BHANERO TEXTILE MILLS	PK:BHA	MURREE BREWERY COMPANY	PK:MRB
BOLAN CASTINGS	PK:BOC	NATIONAL REFINERY	PK:NAR
CAPITAL ASSETS LSG.	PK:CAL	NESTLE PAKISTAN	PK:NPK
CENTURY PAPER	PK:CPB	NIB BANK	PK:NAT
CHEARAT CEMENT COMPANY	PK:CTC	NISHAT (CHUNIAN)	PK:NHT
CRESCENT STEEL	PK:CSA	NOON SUGAR MILLS	PK:NON
CRESCENT TEXTILE MILLS	PK:CTX	ORIX LEASING PAK.	PK:ORI
CYAN LIMITED	PK:CYA	PACKAGES	PK:PAC
DADABHOY CEMENT (~PR) (#T)	PK:DAC	PAK ELEKTRON	PK:PET
DADEX ETERNIT	PK:DAE	PAK SUZUKI MOTOR	PK:PSM
DANDOT CEMENT	PK:DAN	PAKISTAN CABLES	PK:PNC
DAWOOD HRC.CHEMS.CORP.	PK:DDH	PAKISTAN ENGINEERING	PK:PEN
DAWOOD LAWRENCEPUR	PK:DAW	PAKISTAN INTL.AIRLINES	PK:PAL
DEWAN KHALID TEX.	PK:DKT	PAKISTAN NAT.SHIP.	PK:PNS
DEWAN MUSHTAQ TEX.	PK:DMT	PAKISTAN OILFIELDS	PK:POF
DEWAN SALMAN FIBRE	PK:DES	PAKISTAN REFINERY	PK:PRE
DEWAN SUGAR	PK:DSM	PAKISTAN STATE OIL	PK:PSO
DEWAN TEXTILE MILLS	PK:DEW	PAKISTAN SYNTHETICS	PK:PSC
DG KHAN CEMENT COMPANY	PK:DEG	PAKISTAN TELECM.	PK:TLM
EFU GENERAL INSURANCE	PK:ETU	PAKISTAN TOBACCO	PK:PTC
ENGRO	PK:ERO	PARAMOUNT SPNG.MLS. (~PR) (#T)	PK:PSM
FAISAL SPINNING MILLS	PK:FSM	PHILIP MORRIS PAKISTAN	PK:LAK
FAUJI FERTILIZER	PK:FAU	PIONEER CEMENT	PK:PCT
FAZAL TEXTILE MILLS	PK:FZM	POWER CEMENT	PK:POC
FECTO CEMENT	PK:FEC	RAFHAN MAIZE PRDS.	PK:RMP
FEROZE1888 MILLS	PK:NAK	RUPALI POLYESTER	PK:RUP
GATRON INDUSTRIES	PK:GAI	SAIF TEXTILE MILLS	PK:STM
GENERAL TYRE & RUBBER	PK:GTR	SAMBA BANK	PK:CCB

GHARIBWAL CEMENT	PK:GWC	SANA INDUSTRIES	PK:SAN
GLAXOSMITHKLINE PAK.	PK:GLT	SANOFI AVENTIS PAKISTAN	PK:HPN
GRAYS OF CAMBRIDGE	PK:GRY	SAPPHIRE FIBRES	PK:SPP
GUL AHMED TEXTILE MILLS	PK:GUL	SAPPHIRE TEX.MLS.	PK:SAP
GULISTAN SPNG.MILLS (~PR) (#T)	PK:GSM	SEARLE	PK:SEA
HABIB ADM LIMITED	PK:HAB	SERVICE INDUSTRIES	PK:SER
HABIB METROPOLITAN BANK	PK:MET	SHABIR TILES	PK:SHA
HABIB SUGAR	PK:HSM	SHADMAN COTTON MILLS	PK:SCM
HALA ENTERPRISES	PK:HAE	SHAHTAJ SUGAR MILLS	PK:SHJ
HINOPAK MOTORS	PK:HPM	SHAKARGANJ MILLS	PK:SHK
HUB POWER COMPANY	PK:HUB	SHELL PAKISTAN	PK:PBS
HUFFAZ SEAMLESS PIPE	PK:HUF	SITARA CHEMICAL	PK:SIT
ICI PAKISTAN	PK:ICI	SONERI BANK	PK:SON
INDUS MOTOR COMPANY	PK:IMO	SUI NORTHERN GAS	PK:SNG
INTERNATIONAL INDS.	PK:INI	SUI SOUTHERN GAS	PK:SUI
INVEST CAPITAL INV.BANK	PK:ASB	TRI-STAR POLYESTER	PK:TRP
JAVEDAN	PK:JAV		