

Evaluation Of Momentum And Contrarian Strategies For Conventional And Shariah-Compliant Securities: Evidence From Pakistan Stock Exchange

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ABSTRACT

The purpose of this study is to examine the momentum and contrarian profits in the Pakistan Stock Exchange's conventional and Shariah markets. Following the overlapping momentum technique of Jagdeesh and Titman (1993), both markets were analyzed for various combinations of J (formation period) and K (holding period). The findings revealed that long-term holding periods of conventional markets show the presence of contrarian profits (12, 18 and 24 months). However, the momentum strategies have a stronger presence in Pakistan's Shariah markets. Moreover, contrarian strategies have a limited presence in Shariah contexts, for long-term holding periods. This study indicates the existence of arbitrage profits in both markets, and investors should continue to monitor the performance of winners and losers in order to maximize returns on portfolio investments.

Keywords: Momentum Strategy, Contrarian Strategy, Conventional and Shariah Stock Markets, Arbitrage Profits

I: INTRODUCTION

Since 1970's there is a consensus among financial economists over the random walk model for stock behavior. Financial markets are believed to be efficient most of the time but existence of market inefficiency cannot be denied as well. Efficient Market Hypothesis (EMH) states, all available set of information circulating in the market is reflected in existing prices, which leaves market participants with no option to automatically receive a return higher than market.

According to literature momentum effect and contrarian effect are serious violations of the EMH as they are significantly predictable (Kandır and İnan, 2011). Instead of canceling each other's effect, the effects of momentum even enhances themselves due to overreaction and under reaction of investors. Jegadeesh and Titman (1993) first identified the presence of the momentum profit. Their findings nominated the momentum effect as one of the most persistent, robust and serious threat to the Efficient Market Hypothesis (EMH) validity. The concept of contrarian strategy was identified by DeBondt and Thaler, 1985. Literature supports the existence of

contrarian anomalies in various markets. Meier (2014) discussed adaptive efficiency to explain some of the anomalies. The result showed that some of the anomalies fade away with time, whereas some of the anomalies like value and momentum anomalies do not. Agarwal and Tendon (1994), Gultekin and Gultekin (1983) and Ariel (1984) witnessed existence of anomalies in different stock exchanges worldwide.

Global development of Islamic finance is witnessed in recent past. Some key drivers are making Islamic finance industry more efficient and competitive. Comparative literature on Shariah compliant stocks and conventional stocks provided variety of results showing the different as well as same behavior of both types of stocks. All this makes it very important to study Islamic stock markets for different dynamics. There is need to study the existence of Momentum and contrarian profits in Islamic markets and to evaluate their performance. The comparative study in Islamic markets will provide results which can help investors in choosing optimal portfolios.

1.1 Theoretical Support

Efficient Market Hypothesis (EMH) supports that no arbitrage profits can be earned. Mixed results have been gathered through various studies which examines the EMH. Tests of the EMH have been questioned by researchers for treating efficiency of market as an all profit or no profit case (Campbell et al., 1997; Lo, 2004, 2005). Market factors like institutions, regulations, and technology, which are continuously changing, along with market participants' behavior makes the market efficiency an evolving phenomenon. Assumptions of EMH are being criticized by proponents of behavioral finance (Shleifer, 2000). First, EMH claims that all the investors behave rationally while valuing securities. Reality is different as incentives, emotions and biases of the investors influence their decision-making process. This fact is ignored by classical

finance (Barberis, 1998). Second, according to the EMH noise traders trade randomly in the market and cancel each other's trade effect leaving no distinctive impact on the market. However, behavioral finance identified that biases occur due to investors heuristic decision making. Last, the EMH supports that influence of irrational investors are offset by rational arbitrageurs in the market. Contrarily, behavioral finance emphasizes that because of the limited number of rational arbitrageurs, fundamental value cannot be matched in the market (Bodie, Kane and Marcus, 2010).

Lo (2004) presented a theory called Adaptive Markets Hypothesis (AMH) to address the controversies about EMH. AMH allows, market anomalies (market inefficiency) to exist with EMH. Alternative behavioral responses like adaption, natural selection, evolution and competition to financial interactions are soul for AMH. The specific market environment and changing market sentiments encourages the appearance of profitable strategies and factors relating to institutions.

In financial markets, whenever there is a case of a security or group of securities performing opposite to the concept of efficient markets are referred as anomalies. Agarwal and Tendon (1994), Gultekin and Gultekin (1983) and Ariel (1984) witnessed existence of anomalies in different stock exchanges worldwide. Previous research has evidences for calendar, fundamental and technical anomalies in different stock exchange markets around the world. Frankfurter and McGoun (2001) concluded that anomalies could be due to inability of social sciences to incorporate the qualitative aspect along with the quantitative aspect of the phenomenon.

Jegadeesh and Titman (1993) first presented the concept of the momentum profit. Results of their studies showed that significant positive returns can be earned for 3 to 12 month defining periods by buying stocks which performed exceptional in past and selling the stocks which exhibited poor performance. Momentum anomaly is the presence

of the continuous price hike and decreasing prices are further decreasing (Chan et al., 1996). Fama and French (1992) found that except momentum anomaly, all the anomalies got explained by their three factor model which were not even captured by Capital Asset Pricing Model (CAPM). While referring to the contrarian strategy, the stocks whose value have decreased (increased) in the past will witness an increase (decrease) which eventually shows reversed movement of prices. Along with the stock value, the rate of return will also observe an increase (decrease) (DeBondt and Thaler, 1985).

1.2 Research Gap

Capital markets running on Islamic rules are experiencing rapid growth and got attention of practitioners and academics especially after the world financial crisis of 2007-2008; (Hayat and Kraeusl, 2011; Al-Khazali et al., 2014a; Albaity and Mudor, 2012). It is very much necessary to observe the behavior of Shariah stocks in the market. In spite of having Islamic finance relevance, quiet minute evidence the market efficiency has been available in academic literature. Moreover, there exist remarkable differences between conventional and Islamic stocks. Islamic stocks are usually less diversified, concentrated in specific sectors, and are less levered. In comparison to conventional stocks, Shariah-compliant stocks are more illiquid because of small capitalization (Sensoy et al., 2013). Alexakis et al (2017) when studied the long-term relation between Islamic and conventional stock indices found that investors of both markets respond differently to market news. Furthermore, On the basis of different empirical results for both conventional and Shariah compliant markets, there is a need for a study that can explain the behavior of momentum and contrarian anomalies under different market setups globally. This comparative study of Shariah compliant stock markets and their counterparts will shed more light on the behavior and performance of momentum and contrarian

anomalies in Shariah Stock markets and Conventional stock markets.

Therefore, this will make a meaningful contribution in field of Islamic Finance as it evaluates presence and performance of arbitrage portfolios (momentum and contrarian) and compares them in conventional market settings as well.

1.3 Research Questions

Research Question 1: Are shariah-compliant stock markets and their conventional counterparts are efficient?

Research Question 2: Are shariah-compliant stock markets and their conventional counterparts inefficient due to presence of momentum premium in the market?

Research Question 3: Are shariah compliant stock markets and their conventional counterparts inefficient due to presence of contrarian premium in the market?

Research Question 4: Do shariah compliant and conventional stock markets, momentum portfolio investment perform better than investments in either winner or loser?

Research Question 5: Do shariah-compliant and conventional stock markets, contrarian portfolio investment perform better return than investments in either winner or loser stocks?

1.4 Research Objectives

Objective 1: Both Shariah-compliant stock markets and their conventional counterparts are efficient

Objective 2: Both shariah compliant stock markets and their conventional counterparts are inefficient due to the presence of momentum premium in the market

Objective 3: Both shariah compliant stock markets and their conventional counterparts are inefficient due to presence of contrarian premium in the market

Objective 4: In both shariah compliant and conventional stock markets, momentum portfolio investment provides better return than investments in either winner or loser

Objective 5: In both shariah compliant and conventional stock markets, contrarian portfolio investment provides better return than investments in either winner or loser stocks

2: LITERATURE REVIEW

2.1 Islamic Investing

Islamic and non-Islamic indices' comparative study has been conducted by Girard and Hassan (2008). They covered data from Jan 1999 to Dec 2006 and reported that indices run on Islamic principles exhibits more growth.

Alam and Rajjaque (2010) found that in period of general economic downturn, Islamic equities outperform the market in European market. It showed that during general economic downturn Shariah-compliant equity portfolios are less risky, and have higher robustness.

Al-Khazali et al. (2014a) found that conventional indices dominates Islamic indices in all markets except Europe. Study periods were (1996–2012) and (2001–2006). For the period from 2007 to 2012 European, US and Global Islamic stock Indices outperformed the conventional ones. These results showed that during economic meltdowns Islamic investing is a better option as it outperforms the conventional investing.

Ho et al. (2014) also found that during periods of crisis, indices run on islamic rules beat their conventional counterparts. During non-crisis periods no such results were found. However, Hayat and Kraeussl (2011) found that performance of IEFs remained worst in both the market conditions either bearish or bullish. Abdelsalam et al. (2013) research concluded that there is absence of any differences in performance of Islamic funds and non-Islamic funds.

Jawadi et al. (2015) investigated Islamic stock markets via EMH for three major Dow Jones (World, Emerging, and Developed). Results showed, Islamic stock markets of emerging economies are less efficient than Islamic markets of developed economies. These results suggested that benefits can be achieved by investing in these regions.

Recently, Al-Khazali et al. (2016) examined nine conventional and nine Islamic stock indices. They validated the random walk hypothesis (RWH) and the martingale difference hypothesis (MDH). Study period was from 1997 to 2012, results showed that not even one Islamic index was efficient, however efficiency was observed for three conventional indices (Europe, Japan, and UK). Results further showed that both conventional and Islamic indices were efficient during and after the crisis period (2007–2012).

Ben Rejeb, A. and Arfaoui, M. (2019), investigated Islamic stock indices and conventional stock indices for informational efficiency and risk during the period of financial instability. More volatility was observed in the returns of Islamic stock indices than their conventional counterparts. Furthermore Islamic indices proved not to be totally immune against global financial crisis. Results for informational efficiency showed that conventional stock indices were less efficient than the Islamic stock indices.

2.2 Momentum and Contrarian profits

The formative work of Jegadeesh and Titman (1993) showed that the momentum strategy generates profit if the holding period ranges from 3 to 12 months. Subsequent researches relates momentum profits to market sentiments and cognitive biases.

Griffin et al. (2003) performed his research from data across the globe. He argued that both good and bad circumstances can be attributed to economically large and statistically significant momentum profits.

De Bondt and Thaler (1985) presented first study on overreaction (contrarian) anomaly. They

analyzed the monthly rate of returns of the stocks traded on the NYSE for 56 years from 1926 to 1982. These results showed that winning and losing stocks will perform in reverse after 36 months period. USA stock markets also showed the same results. (Howe, 1986), (Brown and Harlow, 1988), (Zarowin, 1989), (Aguilar and Sales (2010)).

Alonso and Rubio (1990), studied the contrarian anomaly and concluded that the past losing stock portfolio's return was 24% more than past winner stock portfolio. Their research sample was from Spanish market. Kato (1990,) found out that contrarian strategy holds true for the Japanese capital markets. Clare and Thomas (1995) checked for validity of the contrarian anomaly in the UK market. They concluded that the past losing stock portfolio's return was 1.7% more than past winner stock portfolio. Literature provided support for existence of contrarian anomaly and contrarian premium in conventional financial markets of various countries which includes South Africa, Canada, Japan, Italy, Germany, UK, and France, Malaysia and China. (Page and Way (1992), (Baytas and Cakici (1999)), (Hameed and Ting (2000)), (Ahmad and Hussain (2001)), (Rafik and Marizka (2017)) , (Doğukanlı and Ergün (2011)), (Das and Krishna Kumar (2015)) , (Chen et al. (2012)) .

Jalal and AttahUllah (2018) studied profitability of the momentum strategies in Pakistan Stock Exchange on weekly and monthly frequent data. On analysing data from 581 companies for the period (2004-2014) presence of momentum profits was witnessed for short and long time horizons. Presence of contrarian profits were witnessed for those time periods where there were penny stocks in the data set.

2.3 Momentum/ Contrarian Anomaly and Shariah compliant Stock market

Farooqi et al. (2015) looked for the prevalence of the momentum strategy in the Dow Jones Islamic Index. They concluded that the momentum strategy works well for Islamic stocks. Narayan and Phan (2017) also inferred similar findings for

the Dow Jones Islamic index. Li et al. (2016) inspected the momentum anomaly in the Malaysian Islamic stock market. He found that there is very limited literature regarding to the momentum strategy for Islamic stocks.

Narayan, Paresh & Phan, Dinh. (2016) studied determinants of momentum profits across large number of Islamic stocks. They witnessed that investors can earn abnormal profits by exercising momentum strategies of shaira'ah stocks. On analysing the risk factors they conclude that source of momentum profit for Islamic shares is mostly because of risk compensation and is not because of mispricing.

Shan, Rashid and Mamunur. (2016) compared performance of Shariah and conventional stocks of Malaysian stock exchange. Results showed that momentum strategy of longer holding period facilitates investors to earn abnormal profits in Shariah market, however conventional shares failed to provide abnormal returns.

Nanda (2019) tested the Islamic stocks for validity of momentum and contrarian strategies. Data for this study was collected from the Jakarta Islamic 30 index for the period of 2010 to 2018. Results showed that there was no proof for validity of momentum and contrarian strategies in the Jakarta 30 index. Tee et al. (2019) analyzed the momentum strategy's validity for the Malaysian capital markets. This study used both conventional and Islamic stocks data and found that for determined that both conventional and Islamic stocks momentum strategies worked very well.

2.2 Hypothesis of study

Hypothesis 1: Both Shariah compliant stock markets and their conventional counterparts are efficient

Hypothesis 2: Both shariah compliant stock markets and their conventional counterparts are inefficient due to presence of momentum premium in the market

Hypothesis 3: Both shariah compliant stock markets and their conventional counterparts are inefficient due to presence of contrarian premium in the market

Hypothesis 4: In both shariah compliant and conventional stock markets, momentum portfolio investment provides better return than investments in either winner or loser

Hypothesis 5: In both shariah compliant and conventional stock markets, contrarian portfolio investment provides better return than investments in either winner or loser stocks

3 Data and Methodology

3.1 Population and sample of study

To investigate the validation of AMH and existence of momentum/ contrarian premium in Pakistan Stock Exchange KMI 30 is used as a representative of Pakistan Shariah based stock market and KSE 100 index is used as a representative of Pakistan Conventional stock market. Data for said indices and for individual stocks from July 2011 to Jun 2022 is gathered from PSX official website. For studying Shariah compliant momentum and contrarian strategies the constituent stocks of KMI 30 as on 30th June

2022 are selected. For studying conventional momentum and contrarian strategies top 30 stocks (non-Islamic shares) of KSE 100 index on the basis of trading volume were selected. We selected those stocks for which data was available for the complete study period i.e. July, 2011 to June, 2022. Shariah investment principles issued by Pakistan stock Exchange and Meezan Bank limited are followed for segregation of conventional and Shariah stocks. Period of study is July 2011 to June 2022.

For companies included in the data set, calculation of the continuous compounded monthly returns of stocks following formula will be used:

$$R_t = 100 * \ln (P_t / P_{t-1}) \quad [1]$$

R_t represents the return monthly

P_t represents the adjusted closing price of index or shares at time period t monthly

P_{t-1} represents the adjusted closing price of index or shares at time period t-1 monthly

	Shariah (KMI 30)	Conventional (KSE 100)
Mean	0.0085	0.0087
Std. Dev.	0.0612	0.0569
Skewness	-0.507	-0.608
Kurtosis	6.222	6.072
Observations	132	132

Table 1: Summary statistics of daily log returns of both indices KSE 30 and KMI 30

Table 1 shows that mean of data across both indices is almost same. Difference in variance of both indices is reported and returns of both indices are skewed to the left.

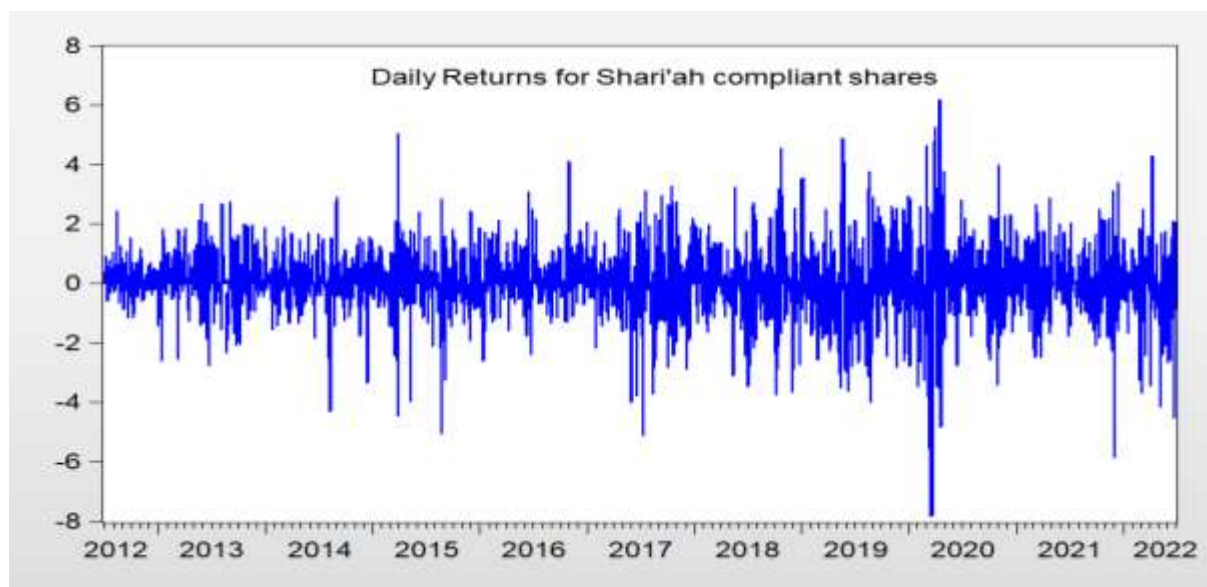


Figure 1a: Log returns of KMI-30 are normally distributed

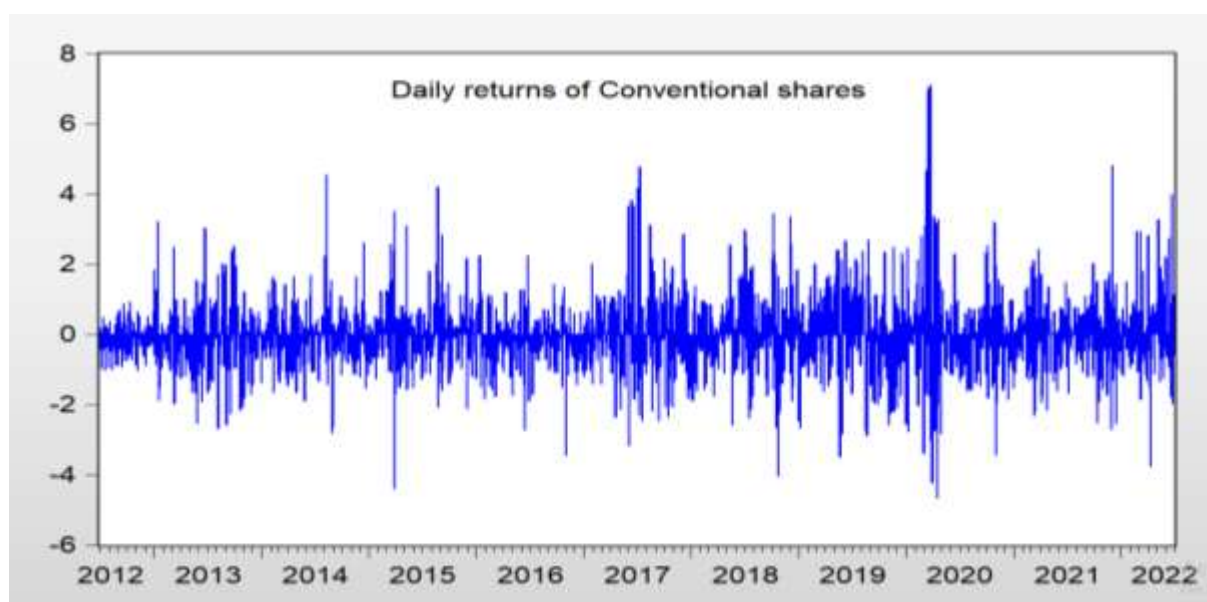


Figure 1b: Log returns of KSE-100 Index are normally distributed

On observing Figure 1a and 1b it is clear that there is a negligible variation in both distributions, which indicates that returns of both conventional and Shariah markets follow same pattern.

3.2 Econometric Model:

3.2.1 Efficiency Test for Shariah and Conventional stock markets of Pakistan:

Normality Distribution of time series data of returns is tested by looking at Jarque Bera values. Jarque Bera is a test for Goodness of Fit. Value closer to zero shows that time series is normally distributed.

Unit root Tests:

To validate and confirm the weak form of market efficiency in both Shariah compliant and conventional stock markets Random walk hypothesis is tested by using unit root tests. The randomness in the daily stock index prices shows that stock index prices are independent and dispersed. According to random walk, current prices (P_t) are free and are in no connection at all with past prices [$(P_{t-1}), P_{t-2}), (P_{t-3})\dots$] hence cannot be used to forecast prospect prices (P_{t+1}) and is represented by

$$P_t = \mu + P_{t-1} + \varepsilon_t$$

Where, P_t = current closing prices,

P_{t-1} , are prices with one lag,

μ is drift, ε_t is random error and “t” is time subscript.

The presence of unit root indicates the time series data is found to be non-stationary or time series is following a random walk when unit root is present in the time series data. It represents that such a time series is weak form efficient and current price absorbs all historical prices in it.

Augmented Dickey-Fuller (1979) Test

The Augmented Dickey Fuller test is largely acceptable unit root test and is used to test autoregressive time series. Haque et al. (2011) also showed that presence of unit root in time series data supports random walk and confirms weak form of market efficiency. Absence of unit root shows that share prices are deterministic in nature and dependent on each other.

The calculated value of ADF t- stats is to be compared with the critical value (Mackinnon tabulated value). When the ADF t- stats is higher than the critical values we accept the null hypothesis which indicates the series is stationary and market is weak form efficient.

$$P_t = \alpha + \rho P_{t-1} + \varepsilon_t \quad [2]$$

Where

P_t represents stock index price at time t

P_{t-1} represents the lag value of the stock index price,

α represents the mean

ε_t is the random error term

Phillips-Perron (1988)-Test

This test follows the nonparametric approach and is used to find out the presence of unit root in time series complex data. It is different from ADF on the basis of treatment of Heteroscedasticity and serial correlation of errors.

The calculated value of PP t- stats is to be compared with the critical value (Mackinnon tabulated value). When the PP t- stats is higher than the critical values we accept the null hypothesis which indicates the series is stationary and market is weak form efficient.

$$y_t = c + \delta t + \phi y_{t-1} + \varepsilon_t$$

c is the intercept

δ is the deterministic coefficient at t

ε_t is error term

The null hypothesis ϕ is equal to 1

The alternative hypothesis is ϕ is less than 1

A test that accepts the null hypothesis mean presence of a unit root.

3.2.2 Formation of J-K overlapping Strategy for Momentum / Contrarian premium

Momentum strategies are classified as cross-sectional and time series momentum. Jegadeesh and Titman (1993) explained cross sectional strategies as inclusion of stocks on the basis of some past period's relative performance. Moskowitz et al., (2012) explained time series momentum as inclusion of securities on the basis of some past period's absolute performance. Under time-series momentum strategy, in strong market condition, there will be more stocks in category of winners and lesser number of stocks

in category of looser and vice versa. In contrast, the same number of stocks will be there in each portfolio irrespective of market performance when focus will be on cross sectional momentum. Cooper et al. (2004) showed that market performance have great impact on results of cross sectional momentum strategies. Market performance is highly determined by the market conditions and market sentiments so considering the market sentiments as important factor of this study, focus our focus is on cross sectional momentum strategies.

In this study j-k relative strength overlapping winner-looser portfolios are formed by using strategy of portfolio formation proposed by Jegadeesh and Titman (1993). Portfolios are made for various formation period also called ranking period (Siganos, 2004) and is denoted by J. Stocks are arranged in descending order on the basis of cumulative returns of J=3,6,9 and 12 months . On the basis of quintiles cumulative returns first 20% stocks are declared as winners and last 20% are declared as losers. These stocks

are then hold for K period. K is used to denote the holding period/ test period (Siganos, 2004; Khan et al., 2016).In literature term of investment period and evaluation period is also used (Vas and Absalonsen, 2014) to represent the duration for which investor holds the investment (Annerstedt and Schonstrom, 2006).Lately, the momentum (contrarian) profits are then calculated by subtracting losers return from winners . It indicates having a long position on winner stocks and short position on loser stocks. One month lag is to be considered for minimizing the micro distortions. In this study various combinations of J and K which includes j=3, 6,9,12 and K=3, 6, 9,12,18,24 are studied. So a j6k12 portfolio on July 1st, 2013 will show the a portfolio performance from 31st December, 2012 to 30th June, 2013 and holding period will ends at 30th June, 2013. For 4 formation periods and 6 different holding periods 24 strategies are formed altogether for conventional and 24 for Shariah stocks. Python distribution is used to make J-k strategies and Eviews 8 is used for rest of analysis.

Formation period			One month gap	Holding period				
t-3	t-2	t-1		t+1	t+2	t+3		
	t-3	t-2	t-1		t+1	t+2	t+3	
		t-3	t-2	t-1		t+1	t+2	t+3

Figure 1: Representation of J-K overlapping momentum strategy for J=3 and k=3 with one month gap

3.2.3: Testing the existence of Momentum/ Contrarian Premium

As momentum/ contrarian strategies are assumed to be zero – cost, therefore the profitability of the returns of Momentum/ contrarian strategies for both Shariah and conventional stocks is compared with benchmark of zero return.

The null hypothesis (H₀): Momentum/ Contrarian portfolio return is equal to zero and information about past doesn't help investors to outperform the market.

$$H_0: R_p = 0$$

The alternative hypothesis (H₁): Momentum/ Contrarian portfolio return is non zero which indicates presence of either Momentum effect or Contrarian profit. When the portfolio return is positive it shows validation of momentum profit and when the portfolio return is negative it validates Contrarian profit.

$$H_1: R_p \neq 0$$

To test null hypothesis one sample test (t-test) have been used. H₀ is accepted when the p. value

is more than 0.10 (10% significance level). H_0 is rejected in favor of H_1 when the p-value is less than 0.10 which shows presence of momentum/ Contrarian profits to earn abnormal profits.

3.2.4: Measuring the profitability of momentum and contrarian strategy:

Following the modern portfolio theory, the Sharpe ratio (1994) is used to measure and evaluate portfolio performance (Liu and Chen 2020) of the momentum/ contrarian strategies. It provides risk adjusted return of Momentum/ Contrarian portfolio via arithmetic returns and standard deviation which is the proxy of total risk. Portfolios estimated returns or past returns are compared with market's benchmark on basis of variability of returns.

$$\text{Sharpe Ratio} = \frac{R_p - R_f}{\sigma_p} \quad (4)$$

 σ_p

where,

R_p = Portfolio's expected return,

R_f = Risk-free rate

σ_p = Portfolio's risk standard deviation

In Equation (4), country index return (both conventional and Islamic stock indices) is a proxy measure for market return. The ninety-one (91) days' T-bill rate is proxy for risk-free rate.

4: Empirical Results and Discussions

The weak form efficiency of Conventional stock market (represented by KSE-100 index) and Shariah stock market (represented by KMI 30) was tested by applying two unit root tests on daily closing data from July 2011 to June 2022. Estimated results are given below

Table 2: Unit Root Tests for KSE-100 Index Daily Returns and KMI-30 Daily Returns: July 2012 to Jun 2022

Index	KMI 30		KSE100	
	Constant + trend		Constant + trend	
ADF	t- stats	P value	t- stats	P value
ADF test Stats	-2.4483	0.3542	-2.3820	0.3889
Mackinnon tabulated values				
1%	-3.9617		-3.9617	
5%	-3.4116		-3.4116	
10%	-3.1276		-3.1276	
PP	-2.9539	0.3638	-3.0864	0.3727
Mackinnon tabulated values				
1%	-3.4116		-3.9617	
5%	-3.1276		-3.4116	
10%	-2.9539		-3.1276	

Note: Table reports Augmented Dicky fuller and Phillips Perron test stats for Shariah stock index KMI-30 and conventional stock index KSE-100

Results from ADF tests indicates that ADF t- stats value for Shariah market (KMI 30) is higher than Mackinnon tabulated values at 1%, 5% and 10% significance levels and p value 0.3889 is higher than 0.05. ADF test for conventional market (KSE 100) also shows the same results as of Shariah market. Results from PP tests indicates that t- stats value for Shariah market (KMI 30) is

higher than Mackinnon tabulated values at 1%, 5% and 10% significance levels and p value is 0.3727 higher than 0.05. PP test for Conventional market (KSE 100) also shows the same results as of Shariah market. These results suggests that Null hypothesis of time series has a unit root (Non- stationary) is to be accepted. Unit root presence shows that time series are stochastic in

nature and there holds a random walk with drift. So both Shariah and Conventional markets of Pakistan Stock exchange are weak form efficient

which provides investors with an opportunity to earn abnormal returns.

Table 2.1: Yearly cumulative returns for conventional stocks in data set

Year	Mean	Median	Maximum	Minimum
2011	-12.167%	-9.276%	24.583%	-48.44%
2012	55.936%	34.782%	234.05%	-12.605%
2013	63.772%	34.017%	519.250%	-16.035%
2014	21.281%	19.324%	150.501%	32.954%
2015	-19.202%	-21.977%	62.873%	-47.069%
2016	30.324%	25.963%	83.658%	-7.743%
2017	-8.422%	-11.832%	56.406%	-43.944%
2018	-4.967%	-5.695%	81.996%	-81.149%
2019	-10.406%	-12.094%	17.396%	-46.393%
2020	-2.545%	-10.980%	171.022%	-41.170%
2021	-6.444%	-7.729%	42.666%	-45.022%
2022	-14.474%	-20.580%	74.615%	-43.751%

Note: The yearly cumulative returns for 30 companies having conventional stocks in the dataset is used to calculate the minimum, maximum, median and mean in each year from year 2011 to 2022

Table 2.1 shows descriptive statistics of the yearly cumulative returns for the companies trading conventional shares from year 2011 to 2022. Year 2013 recorded the maximum yearly cumulative return i.e. 519.250% which represents the presence of market bubble in Conventional market of Pakistan. Year 2018 recorded the

minimum yearly cumulative return i.e. -81.149% which shows that conventional market was experiencing crash at that time. For the complete study period i.e. 2011 to 2022 the mean yearly cumulative returns are 7.72% and median yearly cumulative returns are -5.72%.

Table 2.2: Yearly cumulative returns for Sha'riah companies in data set

Year	Mean	Median	Maximum	Minimum
2011	-12.660%	-7.342%	22.756%	-54.366%
2012	74.308%	37.326%	491.709%	-20.061%
2013	47.750%	41.551%	291.928%	-39.369%
2014	29.023%	24.775%	185.942%	-34.416%
2015	-8.115%	-15.266%	84.782%	-50.951%
2016	78.407%	47.746%	335.026%	6.667%
2017	-20.720%	-30.095%	15.086%	-52.518%
2018	-22.037%	-19.833%	54.687%	-58.249%
2019	-21.594%	-24.945%	23.778%	-61.044%
2020	17.524%	1.513%	218.572%	-63.959%
2021	-17.141%	-18.535%	52.216%	-52.248%
2022	-19.466%	-16.952%	12.012%	-48.670%

Note: The yearly cumulative returns for 30 companies having Shariah stocks are in the dataset is used to calculate the minimum, maximum, median and mean in each year from year 2011 to 2022

Table 2.2 shows descriptive statistics of the yearly cumulative returns for the companies trading Shariah compliant shares from year 2011 to 2022. Year 2012 recorded the maximum yearly cumulative return i.e. 491.709% which represents the presence of market bubble in Shariah market of Pakistan. Year 2020 recorded the minimum

yearly cumulative return i.e. -63.959% which shows that Shariah market was experiencing crash at that time. For the complete study period i.e. 2011 to 2022 the mean yearly cumulative returns are 10.4400% and median yearly cumulative returns are -10.3874%



Figure 2a: Cumulative returns of Shariah market components showing market up and down states



Figure 2b: Cumulative returns of conventional market components showing market up and down states

On observing figure 2a and 2b it is evident that both conventional and Shariah markets experiences almost same market states.

Table 3.1: Momentum/ Contrarian profitability of selected conventional stocks of Pakistan Stock Exchange

j	k	3	6	9	12	18	24
		Months	months	Months	months	Months	months
3 Winner	mean	0.911%	1.256%	1.137%	0.579%	0.252%	-0.343%
	t stat	1.457	2.102	1.771	0.871	0.424	-0.528
	p value	0.148	0.0377* *	0.0792* *	0.386	0.672	0.599
3 loser	mean	0.946%	0.941%	0.733%	0.816%	1.079%	1.158%
	t stat	1.503	1.463	1.044	1.216	1.502	1.710
	p value	0.135	0.146	0.299	0.226	0.136	0.0903* *
3 winner-loser	mean	-0.034%	0.315%	0.404%	-0.237%	-0.827%	-1.501%
	t stat	-0.056	0.569	0.694	-0.370	-1.212	-2.456
	p value	0.956	0.570	0.489	0.712	0.228	0.0157** C
6 Winner	mean	0.885%	0.646%	0.529%	0.668%	0.299%	0.043%
	t stat	1.379	1.150	0.850	1.093	0.460	0.080
	p value	0.170	0.252	0.397	0.277	0.647	0.936
6 loser	mean	0.594%	1.147%	0.363%	0.872%	1.055%	0.464%
	t stat	0.995	1.751	0.518	1.328	1.545	0.605
	p value	0.322	0.0825* *	0.605	0.187	0.125	0.546
6 winner-loser	mean	0.290%	-0.502%	0.166%	-0.204%	-0.755%	-0.420%
	t stat	0.491	-0.898	0.294	-0.354	-1.435	-0.719
	p value	0.624	0.371	0.769	0.724	0.154	0.474
9 Winner	mean	0.593%	0.791%	0.565%	0.092%	-0.186%	-0.024%
	t stat	1.002	1.399	1.098	0.154	-0.298	-0.041
	p value	0.319	0.164	0.275	0.878	0.766	0.968
9 loser	mean	0.717%	0.848%	0.465%	0.713%	1.003%	0.493%
	t stat	1.10581	1.26682	0.68439	1.00157	1.37516	0.63627
	p value	0.2711	0.9167	0.4951	0.3187	0.172	0.5261
9 winner-loser	mean	-0.124%	-0.057%	0.100%	-0.621%	-1.190%	-0.517%
	t stat	-0.22211	-0.10481	0.17213	-0.93705	-2.09729	-0.87031
	p value	0.8246	0.9167	0.8636	0.3507	0.0383** C	0.3862
12 Winner	mean	0.521%	0.544%	0.316%	-0.229%	-0.033%	-0.213%
	t stat	0.8115	0.98056	0.5716	-0.3703	-0.05982	-0.36842
	p value	0.4188	0.328	0.5687	0.7119	0.9524	0.7134
12 loser	mean	0.557%	0.400%	0.466%	0.779%	0.829%	0.272%
	t stat	0.83175	0.5848	0.64157	1.09537	1.0939	0.36453
	p value	0.4073	0.5598	0.5225	0.2758	0.2765	0.7163
12 winner-loser	mean	-0.036%	0.143%	-0.150%	-1.008%	-0.862%	-0.485%

	t stat	-0.0611	0.23122	-0.2479	-1.58172	-1.52919	-0.81866
	p value	0.9514	0.8176	0.8047	0.1166	0.1293	0.415

Significant Momentum profits μ

Significant Contrarian profits c

**, * at 5% and 10% significance levels

Source: Outputs from processing data using Eviews

In table 3.1, on analysing Conventional stocks Winner portfolio's return, it shows that 18 strategies has positive mean return out of total 24 strategies. However, only two of these winner portfolio strategies exhibit significant positive returns which includes J3k6 strategy at 5% significance level and j3k9 strategy at 10% significance level yielding 1.256% and 1.137% return respectively. None of the winner portfolios with negative return yield has statistically significant results. It concludes that for winner portfolios better investment is in the strategies having shorter formation periods. Our results are supporting momentum effect only for shorter period of time i.e. maximum 9 months, as winner portfolio of J=3 starts generating negative returns for k=12 months. Hence for conventional stocks winner portfolios of shorter formation period with shorter holding period enables investors to earn abnormal profits.

While studying Conventional stocks Loser portfolio's return, it shows that all of 24 strategies have positive yield. However, only two of these loser portfolio strategies exhibit significant positive returns which includes J6k6 strategy at 10% significance level and j3k24 strategy at 10% significance level yielding 1.147% and 1.158%

return respectively. It supports the presence of contrarian effect in conventional stock market as investing in the losers stocks on basis of past 6 months and holding them for next 6 months enables investors to earn abnormal profits. Our results support the presence of contrarian effect for medium term holding periods of 24 months as past 3 months loser starts generating positive significant return in next 24 months.

While exploring Conventional stocks Momentum portfolios, it shows that only 6 out of 24 momentum strategies yield positive returns but none of them are different than zero i.e. are statistically significant. Rest of 18 momentum strategies exhibits negative returns while two of them has shown statistically significant results. Portfolio strategy of J=9 and K= 18 with negative mean return of -1.190% is significant at 5% confidence level supports validity of medium term contrarian effect strongly in conventional stock 'market. Furthermore portfolio strategy of j=3 and k= 24 with mean return of -1.051% at 5% significance level authenticates presence of medium term contrarian effect in Conventional stock market and confirms that investors can earn abnormal profits by holding past losers for medium term to earn abnormal profits.

Table 3.2: Momentum/ Contrarian profitability of Selected Shar'iah stocks of Pakistan Stock Exchange

j	k	3	6	9	12	18	24
		Months	months	Months	months	months	months
3 Winner	mean	1.511%	1.107%	0.877%	0.197%	0.119%	0.689%
	t stat	1.936	1.444	1.050	0.237	0.142	0.857
	p value	0.0553*	0.151	0.295	0.813	0.887	0.394
3 loser	mean	0.526%	0.145%	0.152%	0.223%	0.626%	0.377%
	t stat	0.646	0.181	0.194	0.269	0.738	0.413
	p value	0.520	0.857	0.847	0.788	0.462	0.681
3 winner-loser	mean	0.985%	0.962%	0.725%	-0.026%	-0.507%	0.311%

	t stat	1.489	1.490	1.230	-0.047	-0.866	0.477
	p value	0.139	0.139	0.221	0.963	0.388	0.635
6 Winner	Mean	1.907%	1.524%	0.660%	0.557%	0.933%	0.731%
	t stat	2.343	1.823	0.076	0.661	1.079	0.833
	p value	0.0208**	0.071	0.939	0.510	0.283	0.407
6 loser	mean	0.560%	-0.117%	0.063%	0.557%	0.933%	0.731%
	t stat	0.654	-0.146	0.076	0.661	1.079	0.833
	p value	0.514	0.884	0.939	0.510	0.283	0.407
6 winner-loser	mean	1.347%	1.641%	0.597%	-0.349%	-0.349%	-1.167%
	t stat	1.859	2.531	0.942	-0.542	-0.542	-1.774
	p value	0.0654* μ	0.0127** μ	0.348	0.589	0.589	0.079*c
9 Winner	mean	1.489%	1.000%	0.924%	0.111%	0.096%	-0.243%
	t stat	1.824	1.259	1.173	0.133	0.120	-0.267
	p value	0.0708*	0.210	0.243	0.895	0.905	0.790
9 loser	mean	0.215%	0.062%	0.502%	0.475%	0.767%	0.564%
	t stat	0.266	0.075	0.603	0.570	0.844	0.621
	p value	0.791	0.941	0.547	0.570	0.401	0.536
9 winner-loser	mean	1.273%	0.938%	0.422%	-0.364%	-0.671%	-0.807%
	t stat	1.886	1.401	0.649	-0.555	-0.973	-1.182
	p value	0.0618* μ	0.164	0.518	0.580	0.333	0.240
12 Winner	mean	1.524%	1.019%	0.656%	0.161%	0.090%	-0.368%
	t stat	1.842	1.290	0.802	0.197	0.105	-0.409
	p value	0.0681**	0.200	0.424	0.844	0.917	0.683
12 loser	mean	0.133%	-0.079%	0.238%	0.588%	0.781%	0.768%
	t stat	0.158	-0.095	0.282	0.662	0.856	0.805
	p value	0.875	0.925	0.779	0.509	0.394	0.423
12 winner-loser	mean	1.391%	1.098%	0.418%	-0.427%	-0.691%	-1.136%
	t stat	1.999	1.640	0.663	-0.653	-0.931	-1.476
	p value	0.048** μ	0.104	0.509	0.515	0.354	0.143

Significant Momentum profits μ

Significant Contrarian profits c

**, * at 5% and 10% significance levels

Source: Outputs from processing data using Eviews

In table 3.2, on analysing Shariah stocks Winner portfolio's return, it shows that 22 strategies have positive mean return out of total 24 strategies. However, only 4 of these winner portfolio strategies exhibit significant positive returns which includes J3k3 strategy at 5% significance level, j6k3 at 5% significance level, j9k3 at 10% significance level and j12k3 at 10% significance level with mean returns of 1.511%, 1.907%, 1.489% and 1.524% respectively. None of the winner portfolios with negative return yield has

statistically significant results. It concludes that for winner portfolios better investment is in the strategies having shorter holding periods of 3 months. Our results are supporting momentum effect for shorter holding period of time i.e. 3 months but for all the formation periods ranging from shorter time period of 3 months to medium term of maximum 12 months. Hence for Shariah stocks winner portfolios of shorter to medium formation period with shorter holding period enables investors to earn abnormal profits.

While studying Shariah stocks Loser portfolio's return, it shows that 22 strategies have positive mean return and 2 strategies have negative mean return. However, Out of total 24 loser portfolio strategies none of them have statistically significant returns It indicates that contrarian effect is not prevalent in Shariah stock market as holding losers for future on basis of their past performance is not facilitating investors to earn abnormal profits for the future.

While exploring Shariah stocks Momentum portfolios, it shows that 13 out of 24 momentum strategies yield positive returns but 4 of them are different than zero i.e. are statistically significant. These significant strategies includes J6K3 at 10% significance level, J6K6 at 5% significance level, J9K3 at 10% significance level and j12k3 at 5% significance level with mean returns of 1.347%,

1.641%, 1.273% and 1.391% respectively. Our findings supports the presence of momentum effect in the Shariah market. Investors can earn abnormal profits by investing in short to medium term past winners and selling short to medium term losers. They can earn profit even by holding such investments for shorter period of time that ranges from 3 months to 6 months. Rest of 11 momentum strategies exhibits negative returns while 1 of them has shown statistically significant results. Portfolio strategy of J= 6 and K= 24 with negative mean return of -1.744% is significant at 10% confidence level supports validity of medium term contrarian effects in Shariah stock market. It confirms that investors can earn abnormal profits by buying past losers and selling winners of short term and holding it for medium term for medium term i.e. 24 months.

Table 4.1: Sharpe Ratios of Momentum/ Contrarian portfolio, winner, loser and Market for Conventional Stocks

Strategy	winner	Loser	winner-loser	loser-winner
J3k3	2.647%	3.130%	-11.309%	-10.291%
j3k6	8.037%	2.997%	-6.847%	-17.241%
j3k9	5.842%	0.044%	-5.141%	-17.913%
j3k12	-2.113%	1.194%	-14.113%	-7.203%
j3k18	-7.701%	4.650%	-21.866%	1.356%
j3k24	-16.238%	6.224%	-35.970%	12.435%
j6k3	2.200%	-2.077%	-6.787%	-15.757%
j6k6	-1.370%	5.817%	-20.122%	-3.725%
j6k9	-2.957%	-4.827%	-9.137%	-14.549%
j6k12	-0.932%	2.025%	-15.113%	-8.515%
j6k18	-6.326%	4.559%	-27.029%	0.463%
j6k24	-12.408%	-3.426%	-19.408%	-5.236%
j9k3	-2.125%	-0.180%	-14.080%	-9.991%
j9k6	0.992%	1.618%	-13.391%	-11.462%
j9k9	-2.969%	-3.620%	-10.040%	-13.237%
j9k12	-10.049%	-0.221%	-19.170%	-1.540%
j9k18	-14.182%	3.623%	-32.715%	7.836%

j9k24	-12.692%	-3.038%	-20.880%	-3.560%
j12k3	-3.114%	-2.348%	-12.033%	-10.893%
j12k6	-3.123%	-4.476%	-8.833%	-13.146%
j12k9	-7.046%	-3.425%	-13.701%	-9.037%
j12k12	-14.788%	0.651%	-26.008%	4.154%
j12k18	-13.637%	1.280%	-27.698%	2.292%
j12k24	-16.474%	-6.218%	-20.728%	-4.189%
Mean	-5.439%	0.165%	-17.172%	-6.206%

Note: This table reports Risk adjusted profits of conventional stocks Strategies calculated by using Sharpe ratios. Sharpe ratios are calculated on Excel. 3 month T bill rate of Pakistan is taken as a risk free rate for calculations.

In table 4.1, on analysing conventional winner portfolios sharpe ratio, it showed that only 5 strategies generate positive ratios which includes J3K3, J3K6, J3K9, J6K3 and J9k6. However, among these 5 only three strategies outperform the loser, momentum and contrarian portfolios. In rest of 19 strategies 13 strategies (of short to medium formation period) have positive mean return of winner portfolio but reason for negative sharpe ratio is greater risk free return. It concludes that in case of down market when R_f will be lower the positive sharpe ratio can be obtained for these 13 strategies as well which will make holding of winner portfolio a profitable strategy. For rest of 6 winner strategies with negative mean returns it is observed that they have medium formation period (9,12 months) and long holding periods of (18, 24) months and not profitable at all. Negative average sharpe ratio of conventional market winner portfolios shows that this is not a good option for investment.

While interpreting the conventional loser portfolio it is observed that 13 strategies have positive sharpe ratio with 11 of them performing better than their counter winner, momentum and contrarian portfolios. Among rest of 11 strategies with negative sharpe ratios, 8 strategies have

positive mean return but have negative sharpe ratio only because of higher market risk free return. However 3 other ratios have negative mean returns are of medium formation period and medium to long holding period.

Results of Table 4.1 reports that winner minus loser (Momentum) portfolio strategies for conventional stocks none of them generated positive Sharpe ratio. The negative sharpe ratio is due to two possible reasons. From information of Table 3.1 and Table 4.1 we can infer that 6 strategies out of total 24 strategies have negative sharpe ratio because of negative excess return i.e when average risk free return is deducted from average portfolio return the negative number is obtained. It includes J3K6, J3K9, J6K3, J6K9, J9K9 and J12K6 strategies. For rest of 18 strategies the mean portfolio returns turned to be negative which generates the negative sharpe ratio. This shows that exercising a momentum strategy of Conventional stocks does not facilitate investors to earn beyond the risk free return in the market.

On analyzing loser minus winner (Contrarian) portfolios for conventional it is found that stocks 6 strategies produces positive sharpe ratio. Out of these 6 strategies 4 are having sharpe ratio higher than their counter winner, loser and momentum portfolios. For rest of 18 strategies, 13 strategies have negative sharpe ratio because of higher risk free return as they have positive mean return loser-winner portfolio. The other 5 strategies

having negative mean return are of shorter formation and shorter holding periods.

This discussion shows that holding loser stocks and exercising contrarian strategies of short to

medium term formation period and long holding periods is a profitable approach in conventional stock market.

Table 4.2: Sharpe Ratio of significant Momentum/ Contrarian Strategies for Shariah Compliant Stocks

Strategy	Winner	Loser	winner-looser	looser-winner
J3k3	9.131%	-2.292%	3.518%	-23.667%
j3k6	4.488%	-6.656%	3.278%	-23.917%
j3k9	1.628%	-6.775%	-0.066%	-22.720%
j3k12	-5.984%	-5.711%	-12.563%	-11.694%
j3k18	-7.035%	-1.177%	-20.232%	-3.644%
j3k24	-0.507%	-3.799%	-6.321%	-15.717%
j6k3	13.200%	-1.806%	7.774%	-26.174%
j6k6	8.670%	-9.650%	12.830%	-33.373%
j6k9	-0.808%	-7.464%	-1.923%	-19.270%
j6k12	-6.134%	-1.914%	-15.612%	-5.512%
j6k18	-8.469%	2.249%	-25.975%	3.264%
j6k24	-13.254%	0.016%	-28.417%	6.549%
j9k3	8.555%	-5.845%	7.407%	-27.313%
j9k6	3.133%	-7.394%	2.864%	-22.931%
j9k9	2.294%	-2.546%	-4.376%	-16.422%
j9k12	-6.956%	-2.873%	-15.698%	-5.248%
j9k18	-7.620%	0.397%	-19.636%	-0.827%
j9k24	-10.625%	-1.820%	-22.392%	1.122%
j12k3	8.946%	-6.628%	8.858%	-28.427%
j12k6	3.414%	-9.067%	5.126%	-25.468%
j12k9	-0.840%	-5.468%	-4.638%	-17.108%
j12k12	-6.610%	-1.516%	-16.851%	-4.408%
j12k18	-7.253%	0.552%	-18.773%	-0.516%
j12k24	-12.335%	0.400%	-24.492%	5.329%
Mean	-1.290%	-3.616%	-7.763%	-13.254%

Note: This table reports Risk adjusted profits of Shariah compliant shares Strategies calculated by using Sharpe ratios. Sharpe ratios are calculated through Excel. 3 month T bill rate of Pakistan is taken as a risk free rate for calculations

In table 4.2 on analyzing Shariah winner portfolios sharpe ratio, it showed that 10 strategies generate positive ratios which includes J3K3, J3K6, J3K9, J6K3, J6K6, J9K3, J9K6, J9K9, J12K3 and J12K6. 9 of these strategies outperform their counter loser, momentum and contrarian portfolios. It is noted that all strategies which generate positive sharpe ratio are having short holding period of less than one year. When same portfolios are held for longer holding period they started generating negative sharpe ratios. In rest of 14 strategies having negative sharpe ratio it is observed that 12 strategies have positive mean return of winner portfolio but reason for negative sharpe ratio is greater risk free return. It concludes that in case of down market when R_f will be lower the positive sharpe ratio can be obtained for these 12 strategies as well which will make holding of winner portfolio a profitable strategy. For rest of 2 winner strategies with negative mean returns it is observed that they have medium formation period(9,12) and long holding period of 24 months each and are not profitable at all. Although mean sharpe ratio of shariah market winner portfolios is negative but is the better among the all portfolios options available which indicates that investing in winner portfolios and keeping it for medium time period is a good option for investment.

While interpreting the Shariah loser stocks portfolio it is observed that only 5 strategies have positive sharpe ratio with only 2 of them performing better than their counter winner, momentum and contrarian portfolios. Among rest of 19 loser portfolios with negative sharpe ratios, 17 have positive mean return but have negative

sharpe ratio only because of higher market risk free return. However 2 other portfolios have negative mean returns are of medium holding period.

Results of Table 4.2 reports that 6 of winner minus loser (Momentum) portfolio strategies for Shariah stocks generated positive Sharpe ratio however in case of conventional momentum portfolio none of the strategy reported positive sharpe ratio. All these 6 strategies suggest that buy winners and selling loser on basis of shorter to medium past returns but hold them for shorter period of time. From information of Table 3.2 and Table 4.2 we can infer that 16 strategies out of total 24 strategies have negative sharpe ratio out of which 11 strategies have negative mean return which is a reason of negative sharpe ratio. However, 5 strategies are underperforming because of excess risk free rate. It is shown in the table that all of these non performing strategies are of longer holding period. So in case of Shariah stocks smaller holding period can generate positive returns and investors can use it to earn abnormal profit.

On analysing loser minus winner (Contrarian) portfolios for Shariah it is found that stocks 4 strategies produces positive sharpe ratio. All of these 4 strategies have sharpe ratio higher than their counter winner, loser and momentum portfolios. For rest of 18 strategies, 13 strategies which have negative sharpe ratio because of negative mean return of loser-winner portfolios are of shorter holding period. The other 5 strategies have positive mean return and negative sharpe ratio is because of higher risk free rate in the market.

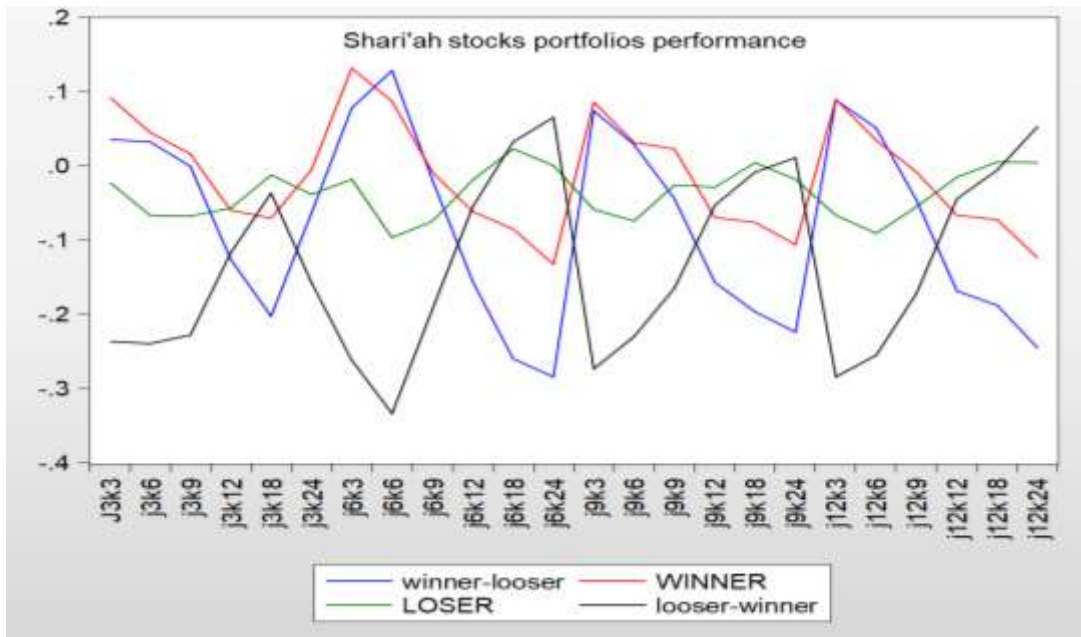


Figure 3a: Performance of Shariah stocks winner, loser, momentum and contrarian portfolio strategies measured by using sharpe ratio

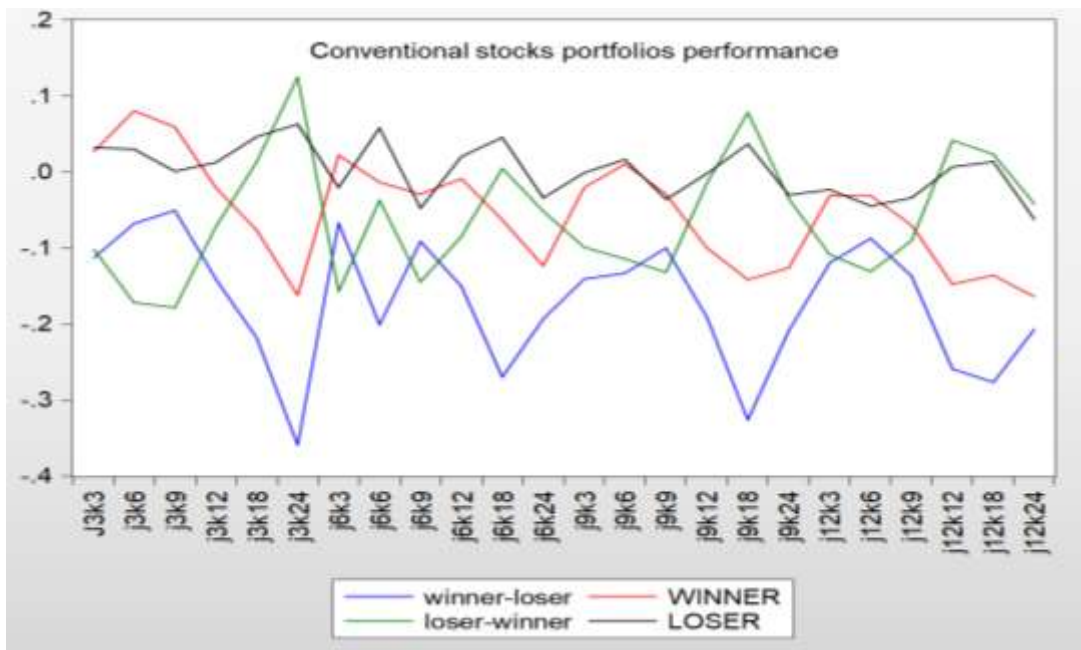


Figure 3b: Performance of conventional stocks winner, loser, momentum and contrarian portfolio strategies measured by using sharpe ratio

Figure 3a and 3b shows that winner, loser, winner minus loser and loser minus winner portfolios behave differently in the setting of Conventional and Shariah markets.

4: Conclusion

Considering the importance, significant growth and elevation of Islamic finance during the last decade we have conducted a comparative study of conventional and Shariah market of Pakistan Stock exchange. As Pakistan stock exchange has almost 50% of the public limited companies who raise capital by issuing Shariah compliant stocks and 50% of them uses conventional shares to raise the capital so this makes Pakistan stock exchange a best population to study. When both markets are tested for market efficiency by using unit root tests (ADF and PP Test) it is found that conventional and Shariah markets of PSX are weak form efficient.

Furthermore in order to add more into literature of arbitrage portfolios performance, both markets were inspected for presence of momentum (winner minus loser) and contrarian (loser minus winner) profits. Following the Jagdeesh and Titman (1993) overlapping momentum strategy, both markets were tested for various combinations of J (formation period) and K (holding period). In conventional markets presence of contrarian profits is witnessed for long term holding periods of (12, 18 and 24 months). However, our results showed that momentum strategies have stronger presence in shariah markets of Pakistan stock exchange. Contrarian strategies have limited presence in Shariah settings for long term holding periods. Our results supports the presence of arbitrage profits in the both markets. Ariel (1984) inferred that anomalies kept on changing themselves and even could disappear on changing the data frequency, and data source and methodology (1998). So once arbitrage profits are found it means that different results can be obtained in future for both conventional and Shariah stocks.

This research also evaluates and compares the performance of arbitrage portfolios with individual winner and loser portfolios performance by using sharpe ratio. In case of Shariah stocks winner stocks outperformed the

loser, momentum and contrarian portfolios, which means that investor can earn highest returns by investing and holding winner stocks. In addition to that, in conventional market holding loser portfolio is best among all other portfolio investment options. Our results of sharpe ratio support that Islamic shares have relatively higher returns and lesser uncertainty.

Since the presence of arbitrage profits is supported in both conventional and Shariah markets, investors should keep monitoring the winners and losers performance to earn maximum returns from portfolio investment.

Data Availability Statement

The datasets analyzed during the current study are available in the Pakistan Stock Exchange <https://www.psx.com.pk/>

Declaration of Conflicting Interests: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding: The author(s) received no financial support for the research, authorship, and/or publication of this article.

References:

1. Akhter, T., & Yong, O. (2019). Adaptive market hypothesis and momentum effect: Evidence from Dhaka Stock Exchange. *Cogent Economics & Finance*, 7(1), 1650441.
2. Alam, N., & Rajjaque, M. S. (2016). Shariah-compliant equities: Empirical evaluation of performance in the European market during credit crunch. In *Islamic finance* (pp. 122-140). Palgrave Macmillan, Cham.
3. Asem, E., & Tian, G. Y. (2010). Market dynamics and momentum profits. *Journal of Financial and Quantitative Analysis*, 45(6), 1549-1562.
4. Barber, B. M., & Odean, T. (2000). Trading is hazardous to your wealth: The common stock investment performance of individual

- investors. *The Journal of Finance*, 55(2), 773-806.
5. Barber, B. M., & Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *The quarterly journal of economics*, 116(1), 261-292.
 6. Baker, M., & Wurgler, J. "Investor sentiment and the cross-section of stock returns," *Journal of Finance*, vol. 61, pp. 1645-1680, 2006.
 7. Boussaidi, R., Dridi, G. The momentum effect in the Tunisian stock market: Risk hypothesis vs. underreaction hypothesis, *Borsa Istanbul Review*, Volume 20, Issue 2, 2020, Pages 178-195,
 8. Rejeb, A. B., & Arfaoui, M. (2019). Do Islamic stock indexes outperform conventional stock indexes? A state space modeling approach. *European Journal of Management and Business Economics*.
 9. Bollerslev, T. (1986). Generalized autoregressive conditional heteroskedasticity. *Journal of econometrics*, 31(3), 307-327.
 10. Chan, K., Hameed, A., & Tong, W. (2000). Profitability of momentum strategies in the international equity markets. *Journal of financial and quantitative analysis*, 35(2), 153-172.
 11. Charles, A., Darné, O., & Pop, A. (2015). Risk and ethical investment: Empirical evidence from Dow Jones Islamic indexes. *Research in International Business and Finance*, 35, 33-56.
 12. Cheema, M. A., & Nartea, G. V. (2017). Momentum returns, market states, and market dynamics: Is China different?. *International Review of Economics & Finance*, 50, 85-97.
 13. Chen, Q., Jiang, Y., & Li, Y. (2012). The state of the market and the contrarian strategy: evidence from China's stock market. *Journal of Chinese Economic and Business Studies*, 10(1), 89-108.
 14. Chordia, T., & Shivakumar, L. (2002). Momentum, business cycle, and time-varying expected returns. *The Journal of Finance*, 57(2), 985-1019.
 15. Chui, A. C., Titman, S., & Wei, K. J. (2010). Individualism and momentum around the world. *The Journal of Finance*, 65(1), 361-392.
 16. Cooper, M. J., Gutierrez Jr, R. C., & Hameed, A. (2004). Market states and momentum. *The Journal of Finance*, 59(3), 1345-1365.
 17. Daniel, K., & Moskowitz, T. J. (2016). Momentum crashes. *Journal of Financial economics*, 122(2), 221-247.
 18. De Bondt, W. F., & Thaler, R. (1985). Does the stock market overreact?. *The Journal of finance*, 40(3), 793-805.
 19. Elfakhani, S. M., Hassan, M. K., & Sidani, Y. M. (2007). 16 Islamic mutual funds. *Handbook of Islamic banking*, 256.
 20. Engle, R. (2001). GARCH 101: The use of ARCH/GARCH models in applied econometrics. *Journal of economic perspectives*, 15(4), 157-168.
 21. Engle, R. F. (1982). Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation. *Econometrica: Journal of the econometric society*, 987-1007.
 22. Fama, E. F. (1965). The behavior of stock-market prices. *The Journal of Business*, 38(1), 34-105.
 23. Frazzini, A. (2006). The disposition effect and underreaction to news. *The Journal of Finance*, 61(4), 2017-2046.
 24. Girard, E. C., & Hassan, M. K. (2008). Is there a cost to faith-based investing: Evidence from FTSE Islamic indices. *The Journal of Investing*, 17(4), 112-121.
 25. Griffin, J. M., Ji, X., & Martin, J. S. (2003). Momentum investing and business cycle risk: Evidence from pole to pole. *The Journal of finance*, 58(6), 2515-2547.
 26. Grossman, S. J., & Stiglitz, J. E. (1980). On the impossibility of informationally efficient

- markets. The American economic review, 70(3), 393-408.
27. Hayat, R., & Kraeussl, R. (2011). Risk and return characteristics of Islamic equity funds. *Emerging markets review*, 12(2), 189-203.
28. Ho, C. S. F., Abd Rahman, N. A., Yusuf, N. H. M., & Zamzamin, Z. (2014). Performance of global Islamic versus conventional share indices: International evidence. *Pacific-Basin Finance Journal*, 28, 110-121.
29. Huang, D. (2006). Market states and international momentum strategies. *The Quarterly Review of Economics and Finance*, 46(3), 437-446.
30. Jawadi, F., Jawadi, N., & Cheffou, A. I. (2015). Are Islamic stock markets efficient? A time-series analysis. *Applied Economics*, 47(16), 1686-1697.
31. Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of finance*, 48(1), 65-91.
32. Jegadeesh, N., & Titman, S. (2001). Profitability of momentum strategies: An evaluation of alternative explanations. *The Journal of finance*, 56(2), 699-720..
33. Kim, J. H., Shamsuddin, A., & Lim, K. P. (2011). Stock return predictability and the adaptive markets hypothesis: Evidence from century-long US data. *Journal of Empirical Finance*, 18(5), 868-879.
34. Kandir, S. Y., & Halime, I. N. A. N. (2011). Testing profitability of momentum investment strategy in ISE. *Journal of BRSA Banking and Financial Markets*, 5(2), 51-70.
35. Lakonishok, J., Shleifer, A., & Vishny, R. W. (1994). Contrarian investment, extrapolation, and risk. *The journal of finance*, 49(5), 1541-1578.
36. Lekhal, M., & El Oubani, A. (2020). Does the Adaptive Market Hypothesis explain the evolution of emerging markets efficiency? Evidence from the Moroccan financial market. *Heliyon*, 6(7), e04429.
37. Lim, K. P. (2007). Ranking market efficiency for stock markets: A nonlinear perspective. *Physica A: Statistical Mechanics and its Applications*, 376, 445-454.
38. Lim, K. P., & Brooks, R. (2011). The evolution of stock market efficiency over time: A survey of the empirical literature. *Journal of Economic Surveys*, 25(1), 69-108.
39. Lim, K. P., Luo, W., & Kim, J. H. (2013). Are US stock index returns predictable? Evidence from automatic autocorrelation-based tests. *Applied Economics*, 45(8), 953-962.
40. Lo, A. W., & MacKinlay, A. C. (1988). Stock market prices do not follow random walks: Evidence from a simple specification test. *The review of financial studies*, 1(1), 41-66.
41. Meier, C. (2014). Adaptive market efficiency: review of recent empirical evidence on the persistence of stock market anomalies. *Review of Integrative Business and Economics Research*, 3(2), 268.
42. Moskowitz, T. J., & Grinblatt, M. (1999). Do industries explain momentum?. *The Journal of finance*, 54(4), 1249-1290.
43. Moskowitz, T. J., Ooi, Y. H., & Pedersen, L. H. (2012). Time series momentum. *Journal of financial economics*, 104(2), 228-250.
44. Nanda, N. (2019). ABNORMAL RETURN MOMENTUM DAN KONTARIAN PADA SAHAM SYARIAH DI JAKARTA ISLAMIC INDEKS (Doctoral dissertation, Universitas Andalas).
45. Phillips, P. C., Shi, S., & Yu, J. (2015). Testing for multiple bubbles: Historical episodes of exuberance and collapse in the S&P 500. *International economic review*, 56(4), 1043-1078.
46. Phillips, P. C., Shi, S., & Yu, J. (2015). Testing for multiple bubbles: Limit theory of real-time detectors. *International Economic Review*, 56(4), 1079-1134.

47. Phillips, P. C., Wu, Y., & Yu, J. (2011). Explosive behavior in the 1990s Nasdaq: When did exuberance escalate asset values?. *International economic review*, 52(1), 201-226.
48. Sensoy, A. (2013). Generalized Hurst exponent approach to efficiency in MENA markets. *Physica A: Statistical Mechanics and its Applications*, 392(20), 5019-5026.
49. Shah, Jalal and Shah, Attaullah, Contrarian and Momentum Investment Strategies in Pakistan Stock Exchange. *The Pakistan Development review*. (November 2, 2017).
50. Shahid, M. N., Coronado, S., & Sattar, A. (2019). Stock market behaviour: efficient or adaptive? Evidence from the Pakistan Stock Exchange. *Afro-Asian Journal of Finance and Accounting*, 9(2), 167-192.
51. Shahid, M. N., & Sattar, A. (2017). Behavior of calendar anomalies, market conditions and adaptive market Hypothesis: evidence from Pakistan stock exchange. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, 11(2), 471-504.
52. Shefrin, H., & Statman, M. (1985). The disposition to sell winners too early and ride losers too long: Theory and evidence. *The Journal of finance*, 40(3), 777-790.
53. Shi, H. L., & Zhou, W. X. (2017). Wax and wane of the cross-sectional momentum and contrarian effects: Evidence from the Chinese stock markets. *Physica A: Statistical Mechanics and its Applications*, 486, 397-407.
54. Tee, L. T., Kew, S. R., & Low, S. W. (2019). Do momentum strategies perform better for Islamic stocks than for conventional stocks across market states?. *Economic Annals*, 64(221), 107-129.
55. Tripathi, Abhinava & Vipul, Vipul & Dixit, Alok. (2020). Adaptive market hypothesis and investor sentiments: global evidence. *Managerial Finance*.
56. Urquhart, A., & McGroarty, F. (2014). Calendar effects, market conditions and the Adaptive Market Hypothesis: Evidence from long-run US data. *International Review of Financial Analysis*, 35, 154-166.
57. Xiong, X., Meng, Y., Li, X., & Shen, D. (2019). An empirical analysis of the Adaptive Market Hypothesis with calendar effects: Evidence from China. *Finance Research Letters*, 31.
58. Zhou, J., & Lee, J. M. (2013). Adaptive market hypothesis: evidence from the REIT market. *Applied Financial Economics*, 23(21), 1649-1662.
59. Mahlophe, M. I., & Muzindutsi, Testing for market anomalies in different sectors of Johannesburg Stock exchange. *International Journal of Economics and Finance Studies*, 9(1), 219-234.
60. Boussaidi, R., & Dridi, G. (2020). The momentum effect in the Tunisian stock market: Risk hypothesis vs. underreaction hypothesis. *Borsa Istanbul Review*, 20(2), 178-195.
61. Tripathi, A., Vipul, V., & Dixit, A. (2020). Adaptive market hypothesis and investor sentiments: global evidence. *Managerial Finance*.
62. Khan, M. A., & ur Rehman, A. (2018). Returns and Volatility Spillover between Islamic and Conventional Indexes: Evidence from Selected Emerging Asian Markets. *Journal of Islamic Business and Management*, 8(2).
63. Ajmi, A. N., Hammoudeh, S., Nguyen, D. K., & Sarafrazi, S. (2014). How strong are the causal relationships between Islamic stock markets and conventional financial systems? Evidence from linear and nonlinear tests. *Journal of International Financial Markets, Institutions and Money*, 28, 213-227.
64. Alexakis, C., Pappas, V., & Tsikouras, A. (2017). Hidden cointegration reveals hidden values in Islamic investments. *Journal of International Financial Markets, Institutions and Money*, 46, 70-83.

65. Arouri, M. E., Ben Ameer, H., Jawadi, N., Jawadi, F., & Louhichi, W. (2013). Are Islamic finance innovations enough for investors to escape from a financial downturn? Further evidence from portfolio simulations. *Applied Economics*, 45(24), 3412-3420.
66. Azad, A. S., Azmat, S., & Hayat, A. (2019). What determines the profitability of Islamic banks: lending or fee?. *International Review of Economics & Finance*.
67. Bahloul, S., Mroua, M., & Naifar, N. (2017). The impact of macroeconomic and conventional stock market variables on Islamic index returns under regime switching. *Borsa Istanbul Review*, 17(1), 62-74
68. Narayan, Paresh & Phan, Dinh. (2016). Momentum Strategies for Islamic Stocks. *Pacific-Basin Finance Journal*. 42. 10.1016/j.pacfin.2016.05.015.
69. Mong Shan & Rashid, Mamunur. (2016). Is Momentum Trading Profitable from Shariah Compliant Stocks? *Review of Financial Economics*.