Testing Stochastic Trends in Shari'ah-compliant and Traditional Stocks of Pakistan Stock Exchange (PSX)

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Abstract

The essential precondition of efficient markets is desired if funds need to be owed to the highest-valued projects. This is only conceivable Stock prices are well priced and replicate the ultimate value of future free cash flows. The current study is directed to examine Weak Form Efficiency (WFE) by using the indices of Karachi Meezan Index -KMI-30 and Karachi Stock Exchange KSE-30 as proxies on daily data set for the last ten years. The weak form efficient hypothesis was examined through the Random Walk Hypothesis (RWH) in the return series of closing. The statistical results were estimated with the Unit Root Tests namely Augmented Dickey Fuller Test and Philip Perron Test. The results exposed that the stocks of both the indices at levels is non-stationary and a trend is present in the movement and do not follow random walk thus the market is weak form inefficient. But at differenced level significantly rejected the null hypothesis and thus revealed the presence of randomness and market becomes weak form efficient. Furthermore, the estimated results demonstrate that Islamic stock index posted better results in terms of profits but is more volatile than their conventional counterpart. As regards to the informational efficiency, both the indices bear the same situation and are weak form inefficient thus the proper allocation of financial resources is not possible in PSX.

Keywords: EMH, WFE, RWH, Karachi Meezan Index (KMI), Karachi Stock Exchange (KSE)

1. Introduction

The allocation of the ownership is the foremost role of stock markets where stock exchanges play significant role as financial intermediaries (Malkiel & Fama, 1970). Initial public Offering (IPO) in primary market is one of the sources of financing for the companies to raise equity with the help of underwriters (Aktas *et al.*, 2019), and it is anticipated that the companies will use those funds efficiently and ethically. Efficient markets are pre requisites for

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the proper allocation of financial resources. In stock markets which are secondary in nature and where investors bought and sold the securities and efficient markets help in such process. Senarathne (2020) highlights the role of efficient financial markets where it is easy for the firms to increase capital and market participants are eager to interchange titles on firm's future cash flows. Dias et al., (2020) intricate the speculative nature of the stock markets where people are reluctant to invest in stocks but people have dense reasons to invest in stock exchange. In a growing economy, stock ownership takes advantages because the economy is directly linked with corporate earnings.

1.1 Evolution of the Efficient Market Hypothesis (EMH)

The commencement of market efficiency was firmly developed at the opening of the twentieth century. Introductory work on market efficiency was familiarized by Bachelier (1900). He presented the notion of Random Walk Model (RWM) in finance. Further, it was found that prices of stocks move randomly and reflect the past, present, and discounted future events (Poshakwale, 1996). EMH emphasizes that on the influx of new information, market promptly adjusts the aforementioned. Thus, the past data, in general, inserts in stock prices. And in the presence of EMH, the market functions in perfect competition and it is not possible to exploit the market for a long time. RWM provides the base for EMH that describes stock prices swing autonomously and earlier prices are not helpful; random move of stock prices is based on the arrival of information in a random way. The EMH does not give cushion to traders to use trading strategies because stock prices are traded at fair value so the traders do not earn above average return. Fama (1970) classified market efficiency into three forms: weak, semi-strong, and strong. In an efficient market new data hurriedly adjusts itself and on the basis of information. A market has three forms: first, Weak Form Efficiency (WFE) where present prices of shares replicate the available information of the past; second, Semi Strong Form Efficiency where present prices of shares replicate all information of the past and in public accessible data; and the third, Strong Form Efficiency where all past, in public accessible and inside information, reflect in the current prices of the shares. Timmermann & Granger (2004) argued that WFE is widely tested throughout the world because of two main reasons. First, the availability of historical data which is required for estimation and simplicity of the model and researchers have more concern about this form. Secondly, it reveals that if stocks move in systematic pattern and the predictions of future price are possible then the market is inefficient in its weak form. A vast literature on this form of efficiency is available in the developed and the developing countries. Over the years, the concept of market efficiency

generated a long debate and produced two schools of thoughts. First school argues that the future returns are unpredictable because that the markets are efficient (Fama, 1970). Here, the most critical review was carried out by Lo & MacKinlay (1988) who strongly barred the randomness and it supported EMH. However, they concluded that rejections are largely due to the performance of the small stock. The other school argues that EMH and particularly WFE which is widely tested and in contradictory due to the evidence of anomalies like January effect and end of the month effect.

Here it would be worth mentioning the link between RWH and EMH. The followers of market efficiency argue that the stocks returns are fundamentally random thus any speculation based on past information is futile. It states that the future prices cannot be forecasted on the basis of history and any successive stock movement is independent and shares are priced at the level of equilibrium.

1.2 The Need and Evolution of Islamic Finance

In the course of many recent years, scholars and specialists have generally inspected the effective market speculation (EMH) in customary created and creating monetary business sectors Matar (2016). The predetermined number of studies on Islamic records found inside the writing stresses the requirement for extra examination concerning whether the case of strict or good Islamic standards may have driven financial backers to make penances in market effectiveness. Although, modern financial system had played an active role in hastening the economy of the world after the World War II but from the last 50 years, there have been 100 crises (Stiglitz, 2003) and none of the single geographically part of the world has been secured from the effects of such crisis. The financial crisis of 2008 was more severe than any in the past where a huge number of institutions and individual were badly stoned regardless of the mastery of financial analysts. If summarized, the reasons of this crisis are the market discipline which expects reforms in capital markets and the improvement of the structure of the system with prudential regulation. It was documented in the 78th Annual report of Bank of International Settlements (BIS) which was released on June 30, 2008 (Chapra, 2008).

Such financial crises are one of the main reasons for this significant shift towards Shari'ah-compliant stocks and other ethical investments. So, it was deeply felt that investment in stock exchanges must be brought under some ethical boundaries.

1.3 The Growth in Islamic Finance

Islamic Finance has grown up tremendously during last fifty years and it is considered as the fastest growing sector. Islamic Financial Services Industry Stability Report indicates that this sector has been contributing up to 71%, or 1.72 Trillion USD; whereas, other important contributors are Islamic Capital Markets. The future projections of asset growth were amounted to US $3809 with 6% compound annual growth rate (IFSB, 2018). An increase in 2019 of Dow Jones Islamic Index was 8.62% on monthly basis in its Islamic Finance Bulletin of January 2019. Further, The Bulletin reports that “Boeing Capital”, the financing arm of the world's main plane manufacturers, could invest with a bank or financial institution to make a Shari’ah-compliant aircraft-product. Vasgen Edwards who is the managing director of Middle East Africa customer finance, said, "It will be Islamic content and it will support aircraft financing.” (Dias et al., 2020).

1.4 Shari’ah Screening Methodologies

The initial step of Shari'ah screening systems is to reject those organizations whose primary business exercises are impermissible by the Shari'ah lessons (Harjito et al., 2021). For Muslims and different financial backers who take position that any pay created from an organization's non-Shari'ah-agreeable exercises is unclean (Anwar et al., 2020). This viewpoint is generally crucial for all kinds of financial backers. How an organization can check the association for impermissible exercises? To just this inquiry, a financial backer may need to comprehend the organization for an organization's business leads from two viewpoints: The Company's overall business exercises; and its monetary activities (Salah et al., 2020).

These aspects manage the "Area and Activity Based Screening" and the "Quantitative or Financial Screening". The quantitative or monetary screening includes essentially two methodologies: the primary methodology is that an organization's fundamental resources are not chiefly money or money related. The subject of riba' (premium) will be created for an organization's key resources those are cash based exchang of money for cash at a rebate or premium in the light of the fact that in exchanging monetary forms or money, the Shari'ah rules of money trade (bay'al-sarf) is distinguished (Elgattani et al., 2020). Shari'ah rules of obligation exchanging (inlet' al-dayn) should be identified to keep away from any component of riba' where an organization's principle resources ought not to be as obligations. In riba'- related exercises that outperform the average benchmark indicated inside the rule, following methodology is affirming that an organization isn't included straightforwardly or by implication in such exercises (Anwar et al., 2020).

There are two types of riba'-related activities of a company that include obtaining funds from the capital market or banking sector through interest based facilities and investment or placement of cash in conventional or interest based instruments. Paying riba' in conventional loans or receiving riba' from investment activities is focused in this approach i.e. the involvement of the companies in riba'- related activities (Hanif, 2019). In Shari'ah non-compliant instruments only considered that the cash placed or invested. First approach considered all types of cash and debt regardless of whether they are Shari'ah-compliant or not. The trading of such shares at a discount or premium will trigger the issue of riba' (Nor et al., 2019).

In the process of screening, the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) was established in 1990. With the objective of preparing accounting, auditing, governance, ethics and other Shari'ah standards for the Islamic financial institutions, the role of AAOIFI is to standardize the theoretical basis and practices of Islamic financial institutions at a global level. Its standards have gained acceptance across many jurisdictions on either mandatory or recommended basis including Saudi Arabia, Bahrain, UAE, Jordan, Lebanon, Qatar, Sudan, and Syria (ISRA, 2016). Even in countries where they have not been fully adopted like Malaysia and Pakistan, they are still heavily relied upon. The standard was issued as of 20th May 2004.

AAOIFI recognizes a Shari'ah compliant company for the business by ensuring that a company should not be mainly involved in any impermissible business activities such as activities based on riba or interest in like conventional banks, uncertainty in trading and gambling (Halaby et al., 2016).

For financial ratio screening, AAOIFI focused on the following financial ratios: (i) Interest taking deposits less than 30% to market capitalization of total equity; (ii) Interest bearing debt less than 30% to market capitalization of the corporation; and (iii) Total market value of illiquid assets more than 30% to market value of the total assets. Now the paper will briefly explain the indices.

The KSE-30 list is an index dispatched by the Karachi Stock Exchange (KSE) in 2006 in view of on the free buoy of offers. It is an increased variant of the conventional KSE list – the principle stock file utilized as a benchmark to think about costs on the Pakistani Stock Exchange. The essential goal of the KSE-30 Index is to have a benchmark by which the stock value execution can measure up to through some undefined time frame. Specifically, the KSE-30 Index is intended to furnish financial backers with a feeling of how huge organization's contents of the Pakistani value market are performing (Sabir et al., 2019). KSE-30 Index is calculated using the "Free-Float Market Capitalization"

methodology. In accordance with this methodology, the level of index at any point of time reflects the free-float market value of 30 companies in relation to the base period.

KMI-30 is a stock market index in the Pakistan Stock Exchange comprising of thirty companies that have been screened for Islamic Shari'ah criteria. With the base period of 30th June the index was introduced in 2009. With the 12% cap, companies are weighted by float adjusted market capitalization (Rashid et al., 2017). The basic purpose of KSE-Meezan Index (KMI) is to work for as a measure of the performance of Shari'ah compliant equity investments (Rehman et al., (2021). The development of index will expand financial trust and upgrade their cooperation. The free-float technique refers to the philosophy that considers just the market capitalization of free-float portion (Sharif et al., 2020).

In emerging economies like Pakistan, efficient allocation of resources remains a bone of contention and markets are inefficient. Asymmetric information deceives market participants and systematic patterns of information exist in Pakistan stock market which deceives the market efficiency and create informational inefficiency and due to this problem resources are not properly allocated. So, this study has an intention to check the weak form efficiency and make a comparison of the two indices namely KMI-30 Index and KSE-30 of Pakistan Stock Exchange. The study established the following research questions:

- Does weak form efficiency exist in the Shari'ah-compliant index of KMI-30 Index?
- Does weak form efficiency exist in the traditional stocks of KSE-30 Index?
- Does WEF exist in the comparison of Shari'ah-compliant index of KMI-30 Index and the traditional stocks of KSE-30 Index?

This study aims to compare the Weak Form Efficiency in Shari'ah-compliant and traditional stocks within the framework of random walk hypothesis. Market efficiency is examined and inferred from the underlying two indices namely of KSE-30 Index and KMI-30 index for the period of last 10 years from September 2010 to August 2020. Furthermore, a comparison is made to check which index is efficient in its weak form.

The available studies are mainly based on the investigations of individual index like KSE-100 Index and KSE-30 Index and others. So far, no study is offered which investigates the efficiency and grants the comparison of Islamic Index i.e. KMI 30 Index and its counterpart KSE 30 Index. The outcome of this pragmatic study is useful in the stock exchanges of emerging countries like Pakistan. The

earlier information about the efficiency of KMI-30 Index and KSE-30 Index will help the policy makers, asset management managers, finance companies, and the local and foreign investors about their investing decisions where they can frame short to long term investment campaigns to lessen their financial risk and make the most of their profits. This paper will further help the academician and researchers for further investigation of the efficiency.

2. Literature Review

The process of information is the basic function of an efficient market and thus guides the capital towards its best economic use. In the emerging markets, stock prices are politically driven where weak political system generates weak economic system, and in the stock market the invisible hand poorly allocates the capital (Morck *et al*., 2000).

2.1 The role and Economics of Information

Modern finance theories stress the part of information in asset markets and this is the fundamental part of the EMH. The impact of public information is measured in diverse ways where some researchers consider the arrival of information between the days and some consider within the days. French and Roll (1996) differentiated among the public information and private information in the US financial markets. They reported three fundamental motives about fluctuations influx of information in trading hours i.e. public information is greater during trading hours; private information is created during the trading hours by investors and pricing errors during trading raise the volatility. They concluded that the stock return volatility exists within intraday session of stock market. Berry and Howe (1994) stressed on the entrance of hourly public information and its influence on intraday activity. Fama (1998) discussed diverse anomalies about information. He found that stock prices did not adjust quickly to the announcements due to value effects, momentum effect, and size anomalies. However Cutler *et al*., (1989) and Haughan (1991) could not develop any link between information and movement of stocks. Jarociński & Karadi (2020) found the role information and the co-movement of interest rates and stock prices.

2.2 The Concept of Random Walk Hypothesis and its relevance with WFE

The notion of EMH was initially introduced at the start of 20th century by French mathematician Louis Bachelier (1900) who did his PhD thesis under the title of Theories *de la Sp ´ eculation* later which later on was translated in

English. In fact, he established the mathematics and statistics of Brownian motion which is known as geometric Brownian motion. Bachelier (1900) explained that "past, present, and even discounted future events which are reflected in market price but show no apparent to prices changes". In 1908, De Mantissas wrote a book on probability and its application that covers a chapter on finance based on Bachelier's thesis (Sewell 2011). However, Bachelier's thought could not get the attention of researchers in the first half of 20th century but first got the attention of an economist Samuelson (1950) who used the concept and later on his thought was widely investigated by Cootner (1964). Bachelier (1900) investigated that prices of commodity fluctuate randomly. Later on, this idea was brought and investigated in financial markets by Working (1934) and Cowles and Jones (1937) in US stock Market.

In the literature of finance, the first compact attempt to investigate the RWH was made by Fama (1965) in his PhD dissertation. He established that current prices of stocks could not forecast the future prices. He further found a strong indication in favour of RWH which is very much consistent with EMH.

The Radom behaviour is found in the markets of the developed countries like the US Capital markets. Kendall (1953), Fama (1965), Dryden (1970) found the presence of random walk model in the US capital markets. Fama (1965) investigated comprehensively and found the presence of randomness in the daily return in the New York stock exchange. Lo and Mackinlay (1988), on the opposite side, strongly rejected the presence of random walk in the US stock market. In their evidence, they estimated for the sample set of 1962 to 1985 with the help of Vector Regressive (VR) for the different sub-periods.

Frennberg and Hansson (1993) also estimated their results with VR to test the randomness for longer period of time (1919-1990) for Swedish stocks. They found the strong auto-correlation for a short period of time but there is mean reversion for a longer time period in a study conducted by Mensi *et al.,* (2019). They explored the WEF of five European stock markets and made a comparison of the U.S. and global market. Greece was found to be highly inefficient market. Arshed *et al.,* (2019) examined the WEF of KSE-100 index of 75 selected firms over the period June 2004 to March 2014 comprising 2370 observations per firm after using the Panel co-integration approach between current share price and past share price on the daily data. The study found that the firms listed in Karachi Stock Exchange are inefficient firms; therefore, in the case of KSE – 100, it offers information which can be used to make economic profits.

Agustin (2017) observed the weak form of Efficient Market Hypothesis (EMH) in Indonesia Sharia Stock Index (ISSI) over the period of January 3rd 2017 to February 8th 2019.The study is conducted by using Run Test, Autocorrelation Test, Autoregressive Integrated Moving Average (ARIMA), and Paired Sample t-test. The findings display that ISSI is not efficient in the weak form during the period of the study. Obeidat *et al*., (2020) examined the weak-form efficiency of the Amman Stock Exchange using the weekly stock closing prices of shares for the period 2017-2019, comprising of 179 companies. They used the time lag that occurred between one and three weeks through the simple regression, Pearson correlation coefficient, and spearman correlation coefficient. The study found that public joint-stock companies in the Amman Stock Exchange do not follow the Random Walk Hypothesis of prices, and therefore, do not follow the characteristics of a normal distribution.

It is not an easy task for any company to maintain profitability and act in a socially responsible way like Shari'ah-compliant companies because this act demands financial discipline and draws boundary. However, the companies which maintain the both are getting response of institutional and individual investors (Chamil, 2020). The companies following Shari'ah-compliant business are prohibited the businesses of alcohol, gambling weaponry, tobacco, pork, and all such activities which can haram the individual and society. There is a dire need for such processes which bound the firms to work in ethical boundaries which is less risky and which protects the environment. So, Shari'ah-compliant companies provide the solutions not only to the Muslims but also to the World (Kalu, 2019).

Hayat and Kraeussl (2011) examined the characteristics of risk and return of Islamic Equity Funds (IEFs). They selected the sample of 145 IEF to measure their risk and return features over the period of 2000 to 2009. In their findings, IEFs better perform in bearish market but not in bullish market. Bouoiyour *et al*., (2018) tested the WFE of Islamic stock markets by using the MF-DFA to compare the efficiency between (Dow Jones Islamic World Developed-DJIW) and (Dow Jones Islamic World Emerging-DJIWE) for a short-term and long-term time intervals. This was found that the short term behaviour of Islamic stocks was efficient in the developed countries but inefficient in long term and in case of emerging index, the efficiency was consistent for the long term and inconsistent for the short term.

Rejeb and Arfaoui (2019) investigated the efficiency from 1996 to 2016 of Islamic stock indexes as well as its straight foils the DJIM Indices of Emergent Markets, Arab Markets Index, UK Index, US Index, Europe index, Asia-Pacific Index and the World Developed Index with conventional indices in standings of

informational efficiency and risk by using standard GARCH. More volatility was found in Islamic stock but Islamic stocks were found informational efficient.

2.3 A comparison of Weak Form Efficiency of Traditional and Shari'ah -Complaint Stocks

Over the years, researcher managed to find comparison of traditional stocks and Shari'ah-compliant stocks. Hakim and Rashidian (2002) made a comparison of (DJIMI) and Wilshire 5000 Index (W 5000). It was revealed that since 1982 the investments have increased 40 times in Islamic Financial Instruments because they are Socially Responsible Investments.

Hussein (2004) examined the two prominent indexes of FTSE Global Islamic Index and FTSE All-World Index in a bull and bear periods. Islamic index posed significantly positive results in bull period; whereas, the result was opposite in bear market. El Khamlichi *et al*., (2014) empirically verified the Efficacy in weak form of four Islamic indices with their straight foils. Islamic indices of MSCI and FTSE were inefficient as their conventional counterparts whereas the Islamic Indices of Dow Jones and S& P had no assimilating relationships with their equivalent bench marks so these two indices offered the long-term opportunities for the investors.

Ho *et al*., (2014) explored the performance of twelve Islamic indices with conventional indices from eight countries from 2000 to 2011 with four sub-periods. The benchmark of treasury bills and MSCI all world indexes were used as risk-free investment opportunities. The Islamic indices outperformed in financial crises period but remained indecisive in a non-crisis period. Sensoy *et al*., (2015) examined the WEF of twelve different Dow Jones indexes covering Islamic and conventional equity markets for sixteen years on daily basis by using permutation entropy. The conventional stocks were found more efficient than Islamic stocks. Medhioub and Chaffai (2016) identified the high degree of harmonization among five conventional and Islamic stocks except in the case of Indonesia. It was observed that mechanism of products formulation in Islamic finance is similar to the conventional mechanism of product formulation.

2.4 Weak form Efficiency of Traditional and Shari'ah -Compliant Stocks and a Case of Pakistan

In case of Pakistan, some researchers investigated the presence of RWM and tested the WFE of KSE-100 Index. Khalji (1993) investigated the behavior of stocks of Karachi Stock Exchange for the time period of 1981 to 1992 on monthly basis. He found the time-varying behaviour of monthly expected return. On the behavior of stocks, this was an initial type of study in Pakistan.

Haque *et al.*, (2011) found the absence of random walk in stocks of KSE-100 Index thus the market was found WFE. Fraz and Hassan (2016) investigated the KSE-100 Index on daily, weekly, and monthly basis. No evidence of the existence of random walk was found in Stock market of Pakistan thus confirming its weak form inefficiency.

The hypotheses of testing the efficiency contain the ensuing null and alternative hypotheses. This paper is testing the relationship of the current prices which are dependent variables and historical prices are independent variables with trend and without trend.

H_0: The KMI-30 Index of Pakistan stock exchange is weak-form efficient.

H_a: The KMI-30 Index of Pakistan stock exchange is not weak- form efficient.

$2H_0$: The KSE-30 Index of Pakistan stock exchange is weak-form efficient.

$2H_a$: The KSE-30 Index of Pakistan stock exchange is not weak-form efficient.

3. Research Methodology

The initiative of this chapter is the gathering of data, source, and relevance of assessment techniques to check the approximation of the efficiency of KMI-30 and KSE-30. This study scrutinizes quantitatively the efficiency of investing in Shari'ah complaint stocks and makets its comparison with traditional stocks. The RWM is tested with the help of Unit root tests like Augmented Dickey and Fuller (1979) and Phillip-Perron (1988) in the investigation of efficiency of both indices.

3.1 Random Walk Model

This model explains that the stocks movement is independent and the past prices are not even helpful to anticipate the future prices of the stocks, and current prices are not even helpful for the prediction of future prices Herholz *et al.*, (2019). A time series is random if first difference which is the difference from one observation to the next observation is random.

First is without drift which means the absence of parameter where we are testing the relationship of current prices where dependent variable and historical prices are independent variables with trend and without trend.

First without drift

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

Second is with drift

In AR (1) series

$$P_t = C + \beta P_{t-1} + \varepsilon_t \qquad t = 1, 2, 3.....N$$

3.2 Random Walk Model and its Relevance with EMH

The RWM propose that the prices of stocks progress in harmony with random walk and thus prediction is not possible. Thus it confirms the EMH which checks the reflection of all available information and it is the best approximation of an intrinsic value of a company; so the price movement is purely random and there is no profit of profit speculation.

3.3 The Application of Unit Root Test

A unit root is a stochastic trend and sometimes also referred to as random walk with drift. The reason why it is called a unit root is because of the mathematics behind it. A process can be called a monomial which has one term, the constant 1 is monomial.

Sollis (2009) finds that if the occurrence of a unit root for a series is accepted, then the series is said to trail a random walk. If a time series comprises a unit root at the levels and may follow a trend at the first difference form. The unit root confirms that the succeeding movements of stocks prices are not independent and signals a deterministic trend. The results will be estimated with the help of the following econometric tools.

3.3.1 Augmented Dickey and Fuller (1979) Test

In econometrics, the null hypothesis of unit root test is based on a condition that a unit root is present in a time series and in the alternative case series becomes stationary.

H_O : $\emptyset = 1\ (unit\ root\ in\ \emptyset\ (z) = 0) \rightarrow yt \sim I\ (1)$

H_1 : $\emptyset < 1 \sim I\ (0)$

3.3.2 Phillips-Perron (1988)-Test

In econometric, this test depends $\rho = 1 in\ \Delta yt = (\rho - 1)\ yt\text{-}1 + \mu t$ where Δ is the principal contrast administrator which tended to the issues that interaction creating information for y_t may have higher request of autocorrelation.

The sample is collected from two indices namely KMI-30 Index and KSE-30 Index on daily basis started from September 2010 to August 2020 for the last ten years from the official website of PSX and investing.com

4. Results and Analyses

This portion has been organized in the pattern to analyze first the Descriptive statistics then the empirical results of unit root test, and lastly the analysis of estimation is given.

4.1 Descriptive Statistics

	KMI_30_CLOSING	KSE_30_CLOSING
Mean	47294.52	17428.59
Median	50178.11	18685.93
Maximum	91145.45	28173.24
Minimum	14112.07	9104.250
Std. Dev.	21348.33	4733.754
Skewness	-0.039390	-0.121486
Kurtosis	1.750602	1.932155
Jarque-Bera	161.9441	123.9307
Probability	0.000000	0.000000
Sum	1.17E+08	43222901
Sum Sq. Dev.	1.13E+12	5.56E+10
Observations	2480	2480

As the data shows the mean of KMI 30 closes is 47294.52 which is much greater than the mean of KSE 30 which is 17428.59 which shows the average return invested in this index. Volatility is measured in standard deviation. So the standard deviation of KMI 30 (21348.33) is also greater than standard deviation of KSE 30 (4733.754) which shows the investors bear more risk in KMI 30. The data set of KMI-30 is slightly positively skewed and evenly distributed while the data set of KSE-30 is slightly negatively skewed as per the rule of thumb that if skewness is less than -1 or greater than 1, it is said to be highly skewed. As the values of both the indices are more than 1, so the data is highly skewed. In case of Kurtosis, if it is 0 it is said to be perfect normal Kurtosis. If Kurtosis is positive, it is pointy and in our case both are more than 1.5 and pointy but at the same time our data represents the normality because it is less than 2. In a time series data, a Jarque-Bera Test is to confirm the normality of data and null hypothesis can only be accepted if p-value is greater than 0.05. It means that the data is normal in our case; the probability values of both indices are 0.0000 which means the rejection of H_0 and acceptance of H_1. Sum is just a total of all

given data and Sum Sq. Dev. (SDM) is a measure of deviation from mean and range is about four times the standard deviation. In our case, the value of KSE-30 Index is more deviated from mean than the value of KMI-30 Index.

The graph below in fig. 4.1 represents the KMI-30 close which shows that at levels mean and variance both follow a certain trend so the Stocks of KMI-30 is moving in a trend thus at level the data is non-stationary.

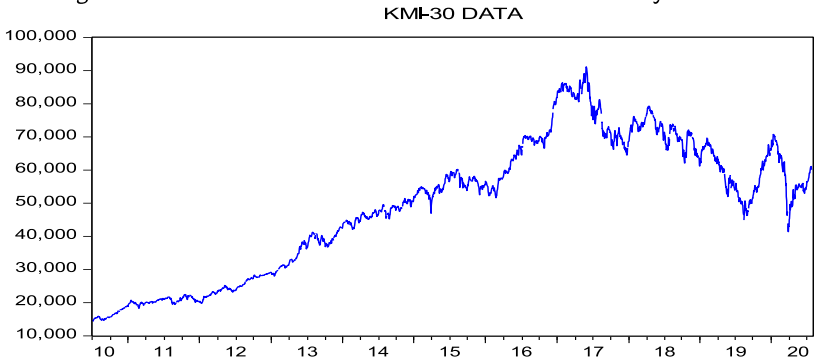

Fig. 4.1 KMI-30 Closings at Levels

The graph below in Fig. 4.2 represents the closings where KMI-30 close is showing that at 1st deference do not follow any certain trend so the Stocks of KMI-30 is not moving in a pattern but randomly. Thus at 1st difference, the data has no unit root and is stationary.

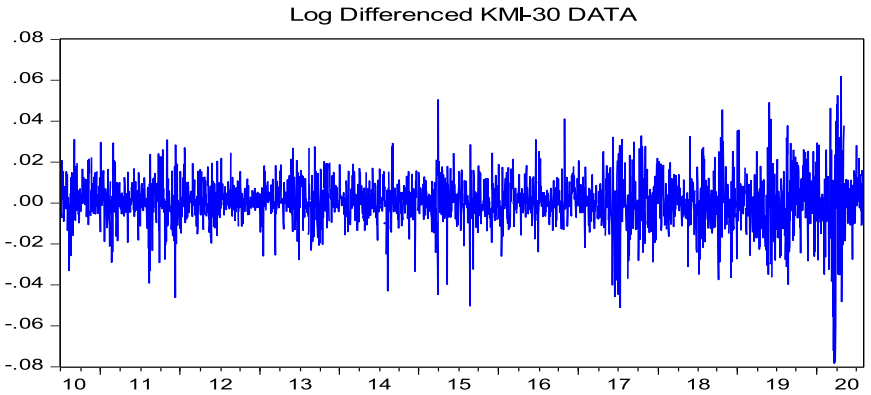

Fig. 4.2 KMI Closings at first Difference

The graph below in Fig. 4.3 represents the closings where KSE-30 close is showing that at levels mean and variance both follow a certain trend so the Stocks of KSE-30 is not moving randomly. Thus at level, the data is non-stationary.

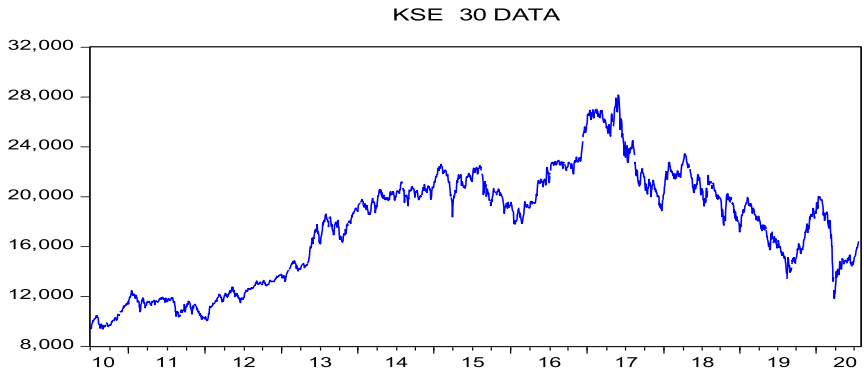

Fig. 4.3 KSE-30 Closings at Levels

The graph below in Fig. 4.4 represents the closings where KSE-30 close is showing that at 1st deference mean and variance both do not follow a certain trend. So, the Stocks of KSE-30 is moving randomly and does not follow any pattern. Thus at 1st difference the data is stationary.

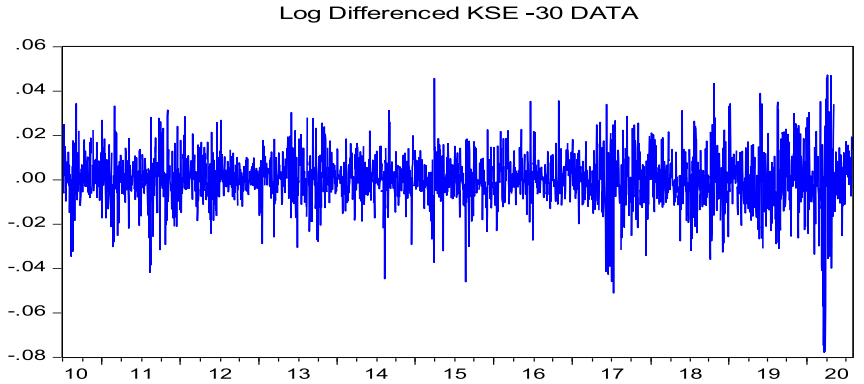

Fig. 4.4 KSE-30 Closings at first Difference

The graph below in Fig. 4.5 represents the combined effect of closings where KMI-30 and KSE-30 close are showing that at levels mean and variance both follow a certain trend so the Stocks of KMI-30 and KSE-30 are not moving randomly thus at level the data is non-stationary.

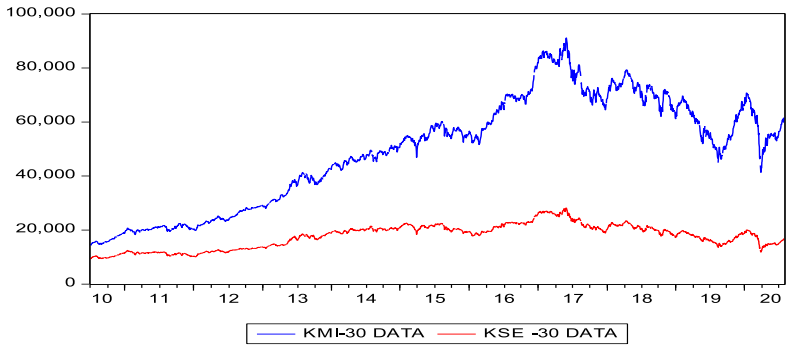

Fig. 4.5 The Combined Effect of KMI-30 and KSE-30 Close at Levels

The graph below in Fig. 4.6 represents the combined effect where KMI-30 and KSE-30 close are showing that at 1st deference mean and variance both do not follow any certain trend so the Stocks of KMI-30 and KSE-30 are not moving in a pattern thus at 1st difference the data is not stationary.

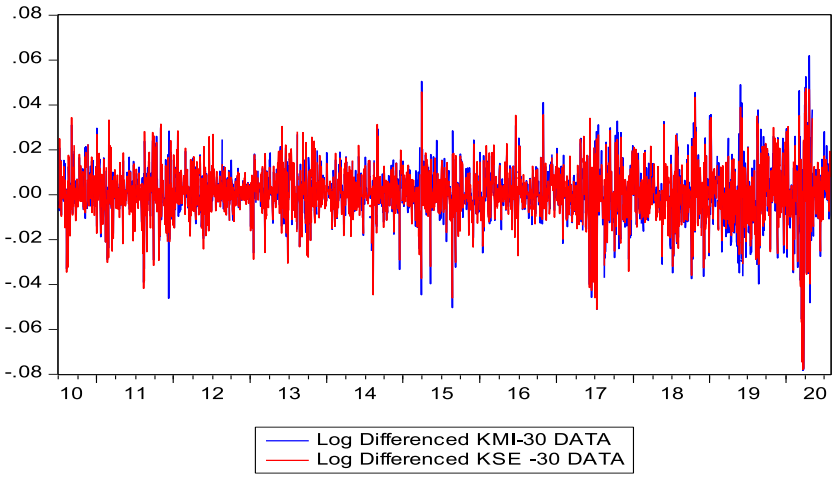

Fig. 4.6 Combine Effect of KMI-30 and KSE-30 Close at 1st Difference

The detail of all tests is given in Table 4.2

4.2 Summary of Tests with No Trend and with Trend for KMI-30 and KSE-30 Indices of Daily Returns for the period of September 2010 to August 2020.

The summary of results is presented below whereas the detail of results is given in Table 4.2

Table 4.2: Unit Root Tests-ADF for KMI-30and KSE-30 Index Daily Returns for the Period of September 2010 to August 2020.

	ADF TEST OF KMI -30				ADF TEST OF KSE-30			
	With Trend		Without Trend		With Trend		Without Trend	
Series	t-value	*p-value*	t-value	*p-value*	t-value	*p-value*	t-value	*p-value*
p_t	-1.417654 (-3.411743)	0.8559	1.269032 (-1.940960)	0.9485	-1.191131 (-3.411743)	0.9112	0.635636 (-1.940960)	0.8535
r_t	-42.05994	0.0000	-42.01364	0.0000	-41.41531	0.0000	-41.41390	0.0000
	(-3.411743)		(-2.565958)		(-3.411743)		(-1.940960)	

Note: p_t is the t-statistics of closing at levels of KMI-30 index and KSE-30Index and r_t is the returns (first difference of P_t). Level of significance is 5% whereas the values in parenthesis are the critical values for t statistics.

Table 4.3: Unit Root Tests-PP for KSE-30 and KMI-30 Index Daily Returns for the Period of September 2010 to August 2020.

	PP TEST OF KMI -30				PP TEST OF KSE-30			
	With Trend		Without Trend		With Trend		Without Trend	
Series	Trend	Prob./ *p-value*	No Trend	Prob./ *p-value*	Trend	Prob./ *p-value*	No Trend	Prob./ *p-value*
p_t	-1.578450 (-3.411680)	0.8015	1.294608 (-1.940956)	0.9510	-1.425608 (-3.411680)	0.8535	0.542795 (-1.940956)	0.8333
r_t	-41.79413 (-3.411743)	0.0000	-42.01813 (-1.940960)	0.0000	-41.26085 (-3.411743)	0.0000	-41.26098 (-1.940960)	0.0000

Note: p_t is the t-statistics of closing at levels of KMI-30 index and KSE-30Index and r_t is the returns (first difference of P_t). Level of significance is 5% whereas the values in parenthesis are the critical values for t statistics.

4.3 Estimation of Unit Root Tests

The estimation of KMI-30 and KSE-30 is processed through unit root tests.

4.3.1 Results of ADF for KMI-30 with Trend

The test statistics reveals that the probability value at levels is 0.8015 and is greater than the p value of 0.05 or 5% which means that there is trend in the time series and series is not stationary. Whereas in the same scenario, when the estimation of closing was tested at first difference with statistics, the probability value is 0.0000 and is less than the p value of 0.05 or 5% which directs that the null hypothesis cannot be accepted.

4.3.2 Results of ADF for KMI-30 with No Trend

The test statistics reveals that the probability value at levels is 0.9510 and is greater than the p value of 0.05 or 5% which means that there is trend in the time series and series is not stationary. Whereas in the same scenario, when the estimation of closing was tested at fist difference with statistics, the probability value is 0.0000 and is less than the p value of 0.05 or 5% which directs that the null hypothesis cannot be accepted.

4.3.3 Results of ADF for KSE-30 with Trend

The test statistics for KSE-30 Index reveals that the probability value is (0.9112) and is greater than the p value of .05 or 5%. In the same scenario, when the estimation of closing was tested at fist difference with statistics where the probability value is (0.0000) and is less than the p value of 0.05 or 5% which directs that the null hypothesis cannot be accepted.

4.3.4 Results of ADF Test for KSE-30 with No Trend

The test statistics reveals that the probability value is 0.635636 and is greater than the p value of .05 or 5%. It directs the presence of randomness and is WFE. In the same scenario, when the estimation of closing was tested at fist difference with statistics, the probability value is 0.0000 and is less than the p value of 0.05 or 5% which directs that the null hypothesis cannot be accepted.

PP (1979) test is based on the null hypothesis that the series has unit root test so the results at levels and at first difference will decide the acceptance or rejection of the hypothesis.

4.3.5 Results of PP for KMI-30 with Trend

The test statistics for KMI-30 Index where the probability value is (0.8015) and is greater than the p value of .05 or 5%. Whereas in the same scenario when the estimation of closing was tested at fist difference with statistics where the probability value is 0.0000 and is less than the p value of .05 or 5% which directs that the null hypothesis cannot be accepted.

4. 3.6 Results of PP for KMI-30 with No Trend

The test statistics reveals that the probability value is 0.9510 and is greater than the p value of .05 or 5%. Whereas in the same scenario when the estimation of closing was tested at fist difference with statistics where the probability value is 0.0000 and is less than the p value of .05 or 5% which directs that the null hypothesis cannot be accepted.

4.3.7 Results of PP for KSE-30 with Trend

The test statistics for KSE-30 Index reveals that the probability value is 0.8535 and is greater than the p value of 0.05 or 5%. Whereas in the same scenario when the estimation of closing was tested at fist difference with statistics where the probability value is 0.0000 and is less than the p value of .05 or 5% which directs that the null hypothesis cannot be accepted.

4.3.8 Results of PP for KSE-30 with No Trend

The test statistics reveals that the probability value is 0.8333 and is greater than the p value of 0.05 or 5%. Whereas in the same scenario when the estimation of closing was tested at fist difference with statistics where the probability value is 0.0000 and is less than the p value of .05 or 5% which directs that the null hypothesis cannot be accepted.

All the tests reveal that both the indices have unit root at level either with trend or without trend, and the rejection of null hypothesis of unit root confirms the presence of random walk in the series.

5. Discussion

This examination is an experimental examination and is pointed towards researching feeble structure proficiency inside the system of RWH in Karachi securities exchange by looking at two files operational in PSX. The complete exchanging days during the investigation time frame were taken from September 2010 to August 2020 on everyday schedule. To check the RW among the records, parametric test (ADF and PP models) are utilized on return arrangement of files. The presence of market effectiveness recommends that the previous value developments can't gauge future costs hence limiting the

probabilities of uncommon benefits in the securities exchange. This exact activity of market dejects market creators and limits the impact of exploiters along these lines. It supports financial backers' fearlessness which thus could make capital and liquidity subsequently convincing of the monetary development and improvement.

The KMI-30 and KSE-30 indices represent the large market capitalization of PSX. This study is very important for analyzing this framework.. The results have definite implications. First, the analysis of KMI-30 poses some important questions, as compared to KSE-30 returns, the KMI-30 index shows higher return but with more risk in it. By reviewing Shari'ah screening process, both indices share 16 same constituents (details of those are given in Table 4 of appendix 1) and comprises 60% of the total constituents. According to this screening process, remaining 14 constituents are having less important role for checking the efficiency of Islamic index. Shari'ah scripts follow very firm and rigorous policies, involvement of high risk raise the query on the Shari'ah screening process which shows the weak Shari'ah screening policies and their implementation. In the analysis, the KSE-30 presented low risk but at the same time also presented low returns. This is a question mark on the efficiency of such huge market capitalization companies. Here again the 60% of the index consists of same constituents of KMI-30 Index while the 40% of KSE-30 plays a decisive role in determining the efficiency of this index.

6. Conclusion and Policy Recommendations

The current study explores the Weak Form Efficiency of two indices of Pakistan Stock Exchange namely KMI-30Index and KSE-30 Index. In the return series of closing of KMI-30 and KSE-30, the weak form efficient hypothesis was examined through RWH and the estimations of unit root were examined through two unit root tests. The presence of unit root indicated that a time series followed the process of randomness and at differenced level significantly rejected the random behavior. Two statistical results accepted the presence of unit root at levels with trend and without trend thus revealed the absence of weak form efficiency in both indices. The results interpretation can play important role in case of investment decisions made in Shari'ah and conventional stocks of Pakistan. Through this information of inefficiency in the stock markets of the Pakistan, local and multinational investors, investment managers, and even policy makers can make smart investment choices with better risk management.

7. Recommendations

This study gives the following suggestions first, for investors, as the results unveil that both indices are inefficient in weak form so the investors can expect abnormal returns. As KMI-30Index poses higher returns, so could be a choice for aggressive investor as compared to KME-30 Index. For strategy producers, this examination proposes the upgrades in the degree of data and improves the straightforwardness of systems on the lookout. Further, the investigation proposes the following ideas for the upgrades in the degree of data and to improve the straightforwardness of systems on the lookout:

i. Data slack can be compressed by disclosing data liberated from cost.
ii. Enrolled organizations in stock trade ought to be approached to distribute extensive execution reports quarterly for their investors.
iii. Upgrade in the administrative specialists' oversight.
iv. The validity of the data giving in the presentation report ought to be affirmed.
v. The PSX role and functioning needs to be investigating that how efficiently the boards and committees of PSX are performing their role in the process of implementations.

The two indices of KMI-30 and KSE-30 were tested on the basis of efficiency. The results might be different if other indices like KSE all index and KMI all index are tested. For future investigation, it is suggested to study the efficiency of international and regional countries by comparing their traditional and Islamic indices. Future studies can be carried out taken into account at first, the role of dividend pay-out ratio on weak form efficiency. Secondly, studies can be conducted on the role of weak financial policies of government which create poor allocation of resources and become a source of weak form inefficient market. Thirdly, for attaining correct information, SECP needs to play important role to check that why policies are not properly implemented and why companies are not providing the accurate information on accurate time to the investors.

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