Random Walk Hypothesis: An Empirical Comparison of Shari'ah and Non-Shari'ah Capital Markets of Pakistan and China

Muhammad Shehryar[1], Furrukh Bashir[2], Kashif Raza[3], Rashid Ahmad[4]

[1] Lecturer, UE Business School, Division of Management and Administrative Sciences, University of Education, Lahore, Pakistan. Email: mshehryar@ue.edu.pk
[2] Assistant Professor, School of Economics, Bahauddin Zakariya University, Multan, Pakistan.
 Email: furrukh@bzu.edu.pk
[3] Lecturer, Department of Economics, The Islamia University of Bahawalpur, Bahawalnagar Campus, Pakistan.
 Email: kashif.raza@iub.edu.pk
[4] Assistant Professor, School of Economics, Bahauddin Zakariya University, Multan, Pakistan.
 Email: rashidahmad@bzu.edu.pk

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ABSTRACT

The instant research comparatively determines the weak-form informational efficiency of Shari'ah and corresponding non-Shari'ah equity indices of Pakistan and China by testing the Random Walk Hypothesis. For this purpose, this study employed the Automatic Variance Ratio on the daily index data for the time ranging from 1st July 2009 to 30th June 2018. The findings of the study show that the Shari'ah index of Pakistan (KMI-30) is informational efficient in weak-form but the Shari'ah index of China (FTSE Shariah China Index) is not efficient. On the other hand, as far as the non-Shari'ah indices are concerned, KSE-100 Index (Pakistan) is not weak-form efficient, but the Shanghai Composite Index (China) is efficient. So, it is determined that in Pakistan, the Shari'ah equity market is weak form efficient during the sample period but its counterpart non-Shari'ah equity market is not efficient. Further, in China, the non-Shari'ah stock market is weak-form efficient, but its Shari'ah stock market is not efficient. In the nutshell, it is concluded that the Shari'ah indices are also witnessing efficiency along with non-Shari'ah indices, and Shari'ah indices viz-a-viz Shari'ah stocks can be good option for optimum investment.

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Corresponding Author's Email: mshehryar@ue.edu.pk
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1.   Introduction

After the Subprime Mortgage Crises of 2007-2009, researchers and practitioners thought about another architecture and system, i.e. The Islamic Financial System, which will accommodate the world to reduce the occurrence as well as the intensity of said crises ahead (Chapra, 2008). The modalities of the Islamic Financial System are mentioned in a crystal-clear manner in the Holy Qur'an (A holy book of the last Holy Prophet Muhammad) and Sunn'ah (practices of Holy Prophet

Muhammad (M. K. Hassan, Rabbani, & Ali, 2020; Rabbani et al., 2021; Raza Rabbani et al., 2021). In Islam, two Arabic words are mostly used, one is Halal which means "something allowed as per Shari'ah" and the second word is Haram (opposite of Halal) which means "something which is not allowed and sinful as per Shari'ah" (Muhamed & Ramli, 2018; Tieman, 2019; Wilson, 2014). Islam permits only Halal sources of income and does prohibit the income earned from Haram sources like Usury or Riba (interest), Gharar (extreme uncertainty), Maisir (speculation, gambling, short-sale), pornography, the trades of alcohol, pig relevant products, drugs, and so on (O. M. Al-Khazali, Leduc, & Alsayed, 2016; R. Hassan & Salman, 2017). In this respect, the instant study expresses its attention towards Islamic Finance and thus, comparatively examines the weak-form informational efficiency of Shari'ah and corresponding non-Shari'ah equity indices of Pakistan and China by testing the Random Walk Hypothesis.

The Islamic financial services have shown remarkable growth and diversification around the world during the last many years. Presently, Global Islamic Finance Report 2021 cited that the Global Islamic Financial Assets have jumped to US$ 3 trillion by the close of 2020 from US$ 1 trillion in 2009 by a progress rate of 200%. In this connection, it is stated that the Islamic financial services have gotten extreme attention of Muslim Investors (Shari'ah-compliant) owing to "Profit & Loss Sharing (PLS) modes of financing and adequate market discipline" which are missing in the conventional financial system. Thus Chapra (2008) reported three reasons for excessive lending in the global recession (2007-2009) i.e. i) inadequate market discipline due to the scarce PLS modes of financing ii) increase in the volume of the derivatives (especially Credit Default Swaps) and iii) "too big to fail" institutions. Nevertheless, PLS has merits/benefits over conventional (Al-Zoubi & Maghyereh, 2007). Moreover, besides Shari'ah investors, conventional investors also moved towards the Islamic investment due to the reason that the Global Financial Crises of 2007-2009 affected the conventional capital markets but Shari'ah institutions were more stable (Siddiqi, 2008). So, due to this implausible development, this sector now needs more attention for comprehensive research by academicians.

In order to survive with the rapid development of the Islamic investment sector as well as to fulfill the investors' requirement, most of the conventional financial institutions including Asian Banks now offer Islamic financial products & services e.g., Citibank, Barclays, First National Bank of Botswana, Afriland First Bank, Bank Danamon, Bank Bukopin, HSBC, Bank Muscat, United Arab Bank, Morgan Stanley Bank, Bank Asia, Merrill Lynch Bank, and Bank Syariah Indonesia. Moreover, many countries over the globe have also introduced Islamic indices specifically in the Asian region for instance: KMI-30 index in Pakistan, FTSE Malaysia EMAS Shariah index, FTSE China Shariah index, Singapore Islamic stock index, FTSE Shariah Japan index, Bombay Islamic index, Dow Jones Islamic Market Turkey Index, etc. as well as, besides Asia, the Dow Jones Islamic World Market Index as the most prominent global Islamic index. Afterward, the Subprime Mortgage Crisis of 2007-2009, plenty of investors moved towards the Islamic investment as a good alternative to conventional ones. Further, researchers began to study the different Shariah-compliant investment products & services in all respects e.g. (O. Al-Khazali, Lean, & Samet, 2014; O. M. Al-Khazali et al., 2016; Ali, Shahzad, Raza, & Al-Yahyaee, 2018; Badeeb & Lean, 2018; Charles, Darné, & Kim, 2017; M. K. Hassan, Miglietta, Paltrinieri, & Floreani, 2018; M. K. Hassan, Paltrinieri, Dreassi, Miani, & Sclip, 2018; M. K. Hassan et al., 2020; M. K. Hassan, Unsal, & Tamer, 2016; Ho, Abd Rahman, Yusuf, & Zamzamin, 2014; Khan, Khan, Khan, Khan, & Rahman, 2021; Khatri, Aqil, & Abro, 2021; Rabbani et al., 2021; Raza Rabbani et al., 2021; Setianto & Abdul Manap, 2015; Shehryar, Abbas, Anser, & Raza, 2022). Thus, the instant study also draws its attention towards Shari'ah products and services to accommodate the investors, policymakers, and another aligned stakeholder for their optimum decisions.

In the nutshell, we have many factors which can affect the investment decisions of investors. Therefore, investors should have the knowledge and information about all characteristics of the market to make a good decision. So, in this connection, the utmost imperative feature of any market (Shari'ah-compliant or conventional one) is the randomness of prices of financial assets that whether someone predicts the movement of prices or not based on all kinds of information

(public & private information) as well as how speedily all information be incorporated in the prices of financial assets. In this respect, an important relevant theory is the Random Walk Hypothesis (RWH) which is considered as the central idea of the Efficient Market Hypothesis (EMH). Firstly, Kendall and Hill (1953) introduced Random Walk Hypothesis. Moreover, it was elucidated that a market follows the random walk when prices move randomly and remain at an equilibrium level (Fama, 1965). Therefore, nobody can predict the future movement of prices by using the historical data as well as unable to derive abnormal profit due to the absence of the arbitrage opportunities. But the term "RWH" got popularity when Burton Malkiel, in his book namely "Random Walk Down Wall Street" (published in 1973), stated that when a market is efficient then the prices of stock will move randomly, and this hypothesis is known as Random Walk Hypothesis (RWH). Basically, EMH (introduced by Fama) and RWH both are interlinked and consistent with each other. It means that information is generated and announced in a random manner in the market and therefore, prices will move randomly, and technical and fundamental analysis will not be effective.

Researchers argued that regulators, traders, and academicians are always interested in the level of informational efficiency prevailing in the markets. So, it is necessary for Shari'ah stock indices to be informational efficient. In this context, this study focuses on investigating whether Shari'ah indices of Pakistan as well as China are more informational efficient (weak-form) than their corresponding non-Shari'ah indices by testing the RWH. The present study will express utmost significance in theoretical perspective viz-a-viz in practical perspective. For instance, it will enhance the limited literature of empirical research on Shari'ah financial products & services by testing the RWH comparatively. Further, as per the authors' knowledge, the study in hand uses a longer sample time as compared to prior studies and employs a more robust test namely Automatic Variance Ratio as compared to typical Variance Ratio which has some limitations. So, besides giving future direction to all researchers, the instant study will give optimum benefit to practical investors, policy developers, economic analysts, and all allied stakeholders for utmost decisions concerning financial assets and the economy.

The study in hand is structured in a way mentioned hereinafter: Literature Review, Data and Methodology, Result and Discussion, and Conclusion and Implications.

2. Literature Review

The upshot of the above is that there are many factors which can affect the investment decisions of Shari'ah viz-a-viz non-Shari'ah investors. Therefore, all investors should have the knowledge and information about all characteristics of the market to make a good decision. In such regard, one of the most important characteristics of any market is informational efficiency and how quickly the market reflects and incorporates all the available information. When all the persons (investors) have the same information at the same time in the market then nobody can earn the abnormal profits by beating the market & other investors. Despite the importance of Shari'ah Finance as well as the significance of informational efficiency in Shari'ah equity markets, limited research has been done on Shari'ah equity markets so far although, during the last two decades, the Islamic financial services and products have shown remarkable growth around the world.

Scarce research is conducted to investigate the risk, returns, and performance of both Shari'ah and conventional indices across the world as well as in Asia. Like, Asutay, Wang, and Avdukic (2021) comparatively examined the performance of Shari'ah and conventional indices of the Asian Market, European Market, USA Market, and Global market. By employing different ratios and CAPM E-GARCH Model for the time ranging from 2007 to 2017 as well as for different sub-periods, said research discovered that the Islamic market outpaced the non-Islamic markets on the basis of risk and returns in almost all periods. Another study by Elshqirat (2021) checked the chances of diversification by examining the impact of COVID-19 on Shari'ah as well as non-Shari'ah indices in the GCC region. By employing correlation test and different performance

parameters, his study found similar results in both indices during COVID-19. Further, many other studies have also been conducted which found that Shari'ah markets, institutions, and instruments outset their non-Shari'ah counterparts on the basis of risk, performance, behavior, volatility e.g. (Al-Zoubi & Maghyereh, 2007; Alam & Rajjaque, 2016; Hakim & Rashidian, 2004; A. Hassan, 2005; M. K. Hassan, Paltrinieri, et al., 2018; Ho et al., 2014; Hoepner, Rammal, & Rezec, 2011; Hussein & Omran, 2005; Khatri et al., 2021), and many others. By drawing attention towards the above studies, the study in hand also shows its motive to examine whether Shari'ah indices of Pakistan, as well as China, outpace the non-Shari'ah indices or not.

Informational efficiency is considered as one of the linchpin features of any market. In this respect, scarce research particularly in Asia is conducted. For instance, El Khamlichi, Sarkar, Arouri, and Teulon (2014) focused on comparatively examining the RWH by employing the Variance Ratio. Similarly, O. M. Al-Khazali et al. (2016); Alam, Arshad, and Rizvi (2016); Guyot (2011); Jawadi, Jawadi, and Cheffou (2015); Khan et al. (2021) , and many other researchers focused on to doing research on market efficiency. In Asian region, several research is also conducted to examine the weak-form efficiency with a certain emphasis on conventional markets but ignored the Shari'ah markets. Scarce research is conducted in this respect like Shehryar et al. (2022) examined the EMH in Islamic indices of Pakistan and Malaysia as well as checked the cointegration & causality amongst said equity market and macroeconomic variables for the time of 2009-2019. Their study found that the Pakistani Islamic index is consistent with EMH but Malaysian is not. They also found long-term causality among said indices and macroeconomic variables. Likewise, some other limited research studies also focused on informational efficiency in Asia e.g. (Ali et al., 2018; Andrianto & Mirza, 2016; Ardiansyah & Qoyum, 2011; OGIEMUDIA & ISIBOR, 2021).

By looking at the above-cited research studies, authors of the instant studies are of the view that very limited studies have been conducted on Shari'ah products and services specifically regarding informational efficiency. It has also been observed that in many studies Shari'ah markets, instruments, and institutions outpaced their corresponding non-Shari'ah counterparts. Thus, by drawing attention towards the above studies, the study in hand also shows its motive to examine whether the Shari'ah indices of Pakistan, as well as China, outpace the non-Shari'ah indices or not.

3. Data and Methodology

For the objectives of the study in hand, two Asian countries are selected based on judgmental sampling and closing index value (after adjustments) on the day wise of two Shari'ah and two non-Shari'ah indices (Table 1) were downloaded from "Datastream" for the time span ranging from 01-07-2009 to 30-06-2018.

Table 1
Sample Design

Countries	Shari'ah Indices	Non-Shari'ah Indices
Pakistan	KMI 30 Index	KSE 100 Index
China	FTSE Shariah China Index	Shanghai Composite Index

Returns on day wise are calculated by using an equation mentioned hereinafter:

$$R_{i,t} = \log(P_{i,t}) - \log(P_{i,t-1}) \qquad (1)$$

Here, $R_{i,t}$ denotes the "returns", $(P_{i,t})$ referents the "closing index price of index i at time t", and $(P_{i,t-1})$ represents the "closing index value on index i at time t-1".

3.1. Methodology

For the testing of the RWH, the instant research employed the Automatic Variance Ratio (AVR) that was established by Choi (1999) and Kim (2009). AVR is a bit more advanced than Variance Ratio (VR) since in VR, the choice of the "number of holding period/lag value" is not automatic while in AVR, the choice of "the number of holding period/lag values or number of autocorrelations" is automatic. Moreover, AVR is strong & dynamic in the presence of conditional heteroskedasticity (non-linear dependence). Further, the standard normal distribution is the base of the null distribution of AVR. Thus, computation of the critical values is no compulsion in a large sample whereas, in the case of small sample size, critical values are computed through a "bootstrapped method".

The mathematical equation of AVR is mentioned hereinafter:

$$AVR(\acute{k}) = \sqrt{T/\acute{k}} \, [V\hat{R}(\acute{k}) - 1]/\sqrt{2} \qquad (2)$$

If Y_t represents "an asset returns at time t (t = 1, . . . ,T)". So, $V\hat{R}$ computed as:

$$V\hat{R}(\acute{k}) = 1 + 2\sum_{i=1}^{T-1} m(i/\acute{k})\acute{\rho}_i \qquad (3)$$

Here $\acute{k}$ represents the "lag order or holding period by selecting optimally", p represents the "sample autocorrelation of order j", T denotes the "sample size" and $m(i/\acute{k})$ represents the "weighting function with positive and declining weights".

Further,

$$\acute{\rho}_i = \frac{\sum_{t=1}^{T-i}(Y_t - \hat{u})(Y_{t+i} - \hat{u})}{\sum_{t=1}^{T}(Y_t - \hat{u})^2} \text{ and } \hat{u} = T^{-1}\sum_{t-1}^{T} Y_t, \qquad (4)$$

Choi (1999) utilized the quadratic spectral kernel for the "weighting function i.e. $m(x)$" that is as under:

$$m(x) = \frac{25}{12\pi^2 x^2}\left(\frac{\sin(6\pi x/5)}{6\pi x/5} - \cos(6\pi x/5)\right) \qquad (5)$$

4. Results and Discussion
4.1. Descriptive Statistics

As far as the descriptive statistics (see Table 21) are concerned, it is to say that the Shari'ah indices of Pakistan and China have more returns than their corresponding non-Shari'ah indices. While the standard deviation/risk of Shari'ah indices in Pakistan and China is more than their corresponding non-Shari'ah indices.

It is worth mentioning that China's both indices' returns are less than Pakistan's as well as Chinese both indices' standard deviations are more than Pakistan's. Further, indices of both countries also have skewness, kurtosis, and Jarque Bera test also endorsed that the returns did not follow the normality. Nonetheless, descriptive findings say that Shariah index viz-a-viz shares are the better choice for investment.

Statistical software 'R' is applied to run the descriptive analysis as well as AVR.

Table 2
Descriptive statistics of returns on daily basis for Shari'ah viz-a-viz non-Shari'ah Indices (2009-2018)

Index	Pakistan	China
Shari'ah Indices Mean	0.00036	0.00008
Sdt. Dev.	0.00503	0.00790
Skewness	-0.589	-0.3606
Kurtosis	24.897	182.90
Jarque-Bera	44241.66	3158290
Prob.	0.0000	0.0000
Non-Shari'ah Indices Mean	0.000344	-0.000011
Sdt. Dev.	0.004251	0.00620
Skewness	-0.45318	-0.9082
Kurtosis	6.80816	8.92710
Jarque-Bera	1412.963	3514.72
Prob.	0.0000	0.0000

4.2. Results for RWH

Table No.3 reflects the AVR's results for the period from 01-07-2009 to 30-06-2018 which are computed at .05 & .10 significance levels. In RWH, the null hypothesis hypothesizes that "prices move randomly and there is no serial correlation or trend in the current day price and previous day price".

Table 3
RWH results over the entire period (2009-2018)

Index	Pakistan	China
Shari'ah Indices AVR	-0.390	-5.124**
P-Value	0.3484	0.000
Non-Shari'ah Indices AVR	3.36**	0.718
P-Value	0.0004	0.2365

*Note:*Significance at 10%. **Significance at 5%*

AVR's statistical values and their corresponding P-values show that the Shari'ah index of Pakistan (KMI-30) is consistent with the RWH but its corresponding non-Sharia'h index (KSE-100) is not consistent with RWH. Moreover, the Shari'ah index of China (FTSE Shariah China index) did not follow the RWH during sample period, but its corresponding non-Shari'ah index (Shanghai Composite index) did follow the RWH. So, it can be inferred that the national and intentional investors can not earn the abnormal returns in Shari'ah equity market of Pakistan by using only past information but can earn in Chinese Shari'ah equity market. Further, investors can earn the abnormal returns in non-Shari'ah equity market of Pakistan by using only past information but cannot earn in Chinese non-Shari'ah equity market. In the nutshell, it is concluded that the Shari'ah indices are also witnessing efficiency along with non-Shari'ah indices, and Shari'ah indices viz-a-viz Shari'ah stocks can be a good option for optimum investment.

5. Conclusion and Implications

By testing the Random Walk Hypothesis (RWH), the instant research comparatively investigated the weak form efficiency of two Shari'ah indices and their corresponding non-Shari'ah indices in order to determine whether Shari'ah indices are more informational efficient than their

corresponding non-Shari'ah Indices. For this purpose, index values on a daily basis based on the time from 01-07-2009 to 30-06-2018 were obtained from "Datastream". Automatic Variance Ratio has been used and its statistical values show that the Shari'ah index of Pakistan (KMI-30) is consistent with the RWH but its corresponding non-Sharia'h index (KSE-100) is not consistent with RWH. Moreover, the Shari'ah index of China (FTSE Shariah China index) did not follow the RWH during the sample period, but its corresponding non-Shari'ah index (Shanghai Composite index) did follow the RWH. The Upshot is that the Shari'ah index of Pakistan (KMI-30) and the non-Shari'ah index (Shanghai Composite index) move randomly and rapidly integrate the past information. So, it can be concluded that the national and intentional investors can not earn the abnormal returns in Shari'ah equity market of Pakistan by using only past information but can earn in Chinese Shari'ah equity market. Further, investors can earn the abnormal returns in non-Shari'ah equity market of Pakistan by using only past information but cannot earn in Chinese non-Shari'ah equity market.

In the nutshell, it is concluded that Shari'ah indices are also witnessing efficiency along with non-Shari'ah indices, and Shari'ah indices as well as Shari'ah stocks can be a good option for optimum investment. Besides giving future direction to all researchers, the instant study will give optimum benefit to practical investors, policy developers, economic analysts, and all allied stakeholders for utmost decisions concerning financial assets and the economy since researchers argued that regulators, traders, and academicians are always interested in the level of informational efficiency prevailing in the markets. Instant research witnessed some limitations like said research could not expand sample size as well as could not expand the time span by making different time windows based on the state of the economy, (bearish, bullish, etc.), COVID-19 windows (pre-COVID-19, COVID-19, post-COVID-19), etc. Instant research recommends for future research that RWH can be investigated in Shari'ah indices based on Adaptive Market Hypothesis by making different time windows based on different events. Moreover, the research in hand also recommends that the impact of different calendar anomalies upon Shari'ah indices may be examined. In addition, the research in question can also be expanded by expanding the sample size through making the samples based on southeast Asia, east Asia, West Asia, central Asia as well as Eurasian Asia can also be added as sample.

Authors Contribution
Muhammad Shehryar: study design and concept, data interpretation, drafting
Furrukh Bashir: literature search, data analysis, data interpretation
Kashif Raza: literature search, data collection, drafting
Rashid Ahmad: critical revision, incorporation of intellectual content

Conflict of Interests/Disclosures
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