An Empirical Assessment of Islamic Index: A Case Study of India

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Abstract

To meet the mounting demand for Shariah Compliant Investment Avenues in equity markets, hundreds of Islamic Indices have been launched world over. Dow Jones and FTSE Global were the first to launch the Shariah Compliant Index namely DJIMI and FTSE Global Islamic Index Series (GIIS). While a number of Shariah compliant Indices have been launched by different publishers like S&P, MSCI, FTSE, Dow Jones and Russell to meet the growing demand but a very few studies have been conducted to assess the performance of these indices in comparison to their counterpart indices in terms of their risk and return. The present study has been undertaken to assess and compare the performance of S&P BSE 500 Shariah and S&P BSE 500 for five years time period i.e., June 2009 to May 2014. To assess the performance of these indices, average monthly raw returns, risk adjusted monthly returns were calculated using time series data of daily closing prices. An attempt has also been made to analyze the risk involved Beta and Alpha has been used. The study also investigates the long term relationship between Islamic Index and its counterpart. The study has revealed that S&P BSE 500 Shariah Index has slightly underperformed the conventional Index during the period under study on the basis of monthly returns. However, the Islamic Index was found to be far less risky than its counterpart Index. Also the two Indices were cointegrated and exhibited long term relationship.

Keywords: Shariah Compliant Index, Beta, Alpha, Cointegration, Islamic Finance.

I. INTRODUCTION

Islamic finance, a system of finance consistent with the principles of Islamic law (Shariah), is based on Quran, Hadith and Ijtihad. The Shariah encourages the use of profit sharing and partnership schemes, and forbids riba (interest), maysir (gambling and pure games of chance), and gharar (selling something that is not owned or that cannot be described in accurate detail; i.e., in terms of type, size, and amount). (El-Gamal 2000)[6]. Conventional intermediation is to a large extent debt-based and permits for the transfer of risk. On the contrary, Islamic intermediation is asset-based, and is based on the sharing of risk between the participants viz. the depositor, bank, and the entrepreneur.

Islamic finance is gaining an important place in the finance market place, particularly due to the recent surge of liquidity in the Middle Eastern capital markets. This in turn is attracting both domestic and international money managers for tapping this market by offering Shariah-compliant funds. Even many western financial institutions (such as Citibank, Barclays, Morgan Stanley, Merrill Lynch and HSBC) are selling Islamic financial products. In addition, the New York and London Stock Exchanges have launched Islamic indexes to track the performance of those firms which operate as per the Islamic investment guidelines, leading towards the process of integration of the Islamic and conventional finance.

While Islamic finance has been around for 40 years, the Islamic Equity market started growing in the mid 90s. Until 1999, there was no official Islamic index to benchmark the returns of Islamic Equity Funds against. Dow Jones and FTSE, were the first who in 1999 launched the Dow Jones Islamic Market Index (DJIMI) and the FTSE Global Islamic Index Series (GIIS) respectively. Nowadays, apart from Dow Jones and FTSE, MSCI Barra and Standard & Poor’s also offer numerous Islamic equity indices.

Islamic indices have been outperforming conventional indices because they do not have any exposure to the conventional financial sector stocks, which have been affected by the credit crisis triggered by the subprime mortgage crisis in
the US. Consequently non-Muslims have started taking Islamic financial sector stocks, as an alternative to the conventional investment portfolio.

To meet the rising demand for Shariah compliant Investment avenues in capital markets, number of Shariah complaint Indices were introduced world-over. In India also the Standard & Poor’s launched S&P BSE 500 shariah with the partnership of S&P Dow Jones and Bombay Stock Exchange. The S&P BSE 500 consists of 500 most liquid and largest Indian stocks trading at the BSE. The number of Shariah-compliant stocks in India is much higher than in Muslim countries put together, thus providing larger scope for Muslim investors. 61 per cent Indian companies are found Shariah-compliant in India against 57 per cent in Malaysia, 51 per cent in Pakistan and a mere 6 per cent in Bahrain.

II. NEED FOR STUDY

While the number of Shariah Compliant indices has been launched to meet the growing demand but very few studies have been conducted on such Indices despite their increasing popularity. Few studies have been made addressing the issue of performance of Shariah compliant equity funds. While some of the studies concluded that Islamic equity funds underperform their conventional counterparts because of limited diversification (Hassan 2002)[11]. Others argued that their performance is at par or even better than their counterparts [Hussein and Omran (2005)[14]. While other researches’ have shown that it varies in bull and bear market periods [Hussein (2004)[13], Abdullah et. al. (2002)[11] and different regions [Hoepner, Hussain and Rezec (2010)[3]]. This paper studies the impact of Shariah screening on the performance of S&P BSE 500 and aims to find answer to the following questions:

- Does the Islamic index achieve lower return levels compared to its counterpart?
- Does the Islamic index bear higher risk than its counterpart?
- Does there exist a long-term relationship between Islamic Index and its counterpart?

The rest of the paper is organized as follows: Section 3 provides the background of Islamic Indices studied in the paper. Section 4 summarizes the empirical studies on Islamic the performance of Indices. Section 5 highlights the hypothesis of the study. Section 6 gives the description of data and methodology used in the study. Results have been discussed in section 7 and subsequently section 8 presents the summary and conclusion.

III. BACKGROUND OF ISLAMIC INDICES

Over the last decade or so, a number of developments have taken place in the global stock market, two important among them being the diversion of both Retail and Institutional investors towards socially responsible investment portfolios and increasingly linking investments to indices. The investors particularly in Muslim countries were driven to look for alternatives to conventional investment due to the Asian Financial Market crises in 1997 and more importantly the recent meltdown in the capital markets world-over. To meet the demand for Shariah Compliant Investment Avenues in equity Markets, Number of exchanges world-over have launched Islamic indices. Recognizing the need for such indices, S&P Dow Jones Indices began with the application of Shariah screens to S&P 500, S&P Europe 350 and S&P Japan 500 resulting in the formation of their Shariah compliant indices. Later on they extended the establishment of shariah compliant indices in other conventional stock markets world-wide till 2013, when they created S&P BSE 500 with the partnership of S&P Dow Jones and Bombay Stock Exchange. The S&P BSE 500 consists of 500 most liquid and largest Indian stocks trading at the BSE.

Following Shariah investment principles, S&P BSE 500 selects the companies to be included in the index on the basis of their latest financial statements in order to ensure that a particular company does not violate any of the established Shariah standards. Further the index excludes those businesses which are directly active in industries such as Tobacco, Pork ,Conventional Financial Services, Gambling, Cloning, Pornography, Advertising & media(except those generating more than 65% of total income from the GCC countries, news channels, newspapers and sports channels). Since Shariah investment guidelines do not permit investment in companies gaining significant income from interest or having excessive leverage, S&P BSE 500 uses the following three financial ratios to screen for these companies:

a) Leverage compliance where in Debt/Market Value of Equity (36 month average) should be less than 33%.

b) Cash compliance where in Accounts Receivables/Market Value of Equity (36 month average) should be less than 49%

c) (Cash + Interest bearing securities)/ Market Value of Equity (36 month average) should be less than 33%.

d) Revenue share from non compliant businesses where in (non permissible income other than interest income)/Revenue should be less than 5%.
IV. LITERATURE REVIEW

There has been a considerable debate on the performance of the Shariah complaint indices over years since their introduction into the global financial investments. On the basis of various aspects of Shariah Compliant investments like, risk and return and overall performance of the Islamic Investments, several studies have been undertaken during past few decades. For example, Hassan (2002)[11] examined the issues of market efficiency and the time-varying risk-return relationship for the DJIMI over 1996-2000. Using several statistical tests, such as serial correlation; variance ratio; and Dickey-Fuller tests, the study revealed that DJIMI returns are normally distributed and the DJIMI has significant market efficiency. The study also found that there is operational inefficiency with DJIMI that needs to be corrected to make the risk behavior of DJIMI stable overtime. Abdullah et. al. (2002)[1] using multiple performance measures (Sharp Ratio, the Modigliani Measure and the Information Ratio) on 67 Malaysian unit trust funds including 14 Islamic and 53 Conventional Funds has found that both Islamic and conventional funds slightly underperformed the Kuala Lumpur Composite Index (KLCI) benchmark. They also revealed that the returns of the Islamic and Conventional Funds are almost same. However while taking the risk factor into account, Islamic Equity fund (IEF) performed better than conventional funds during bear markets and the conventional funds outperformed IEFs during bull phases.

Hussein (2004)[13] while comparing the performance of the FTSE Global Islamic index with that of FTSE All-World Index during 1996-2003, concluded that no significant difference exists in the performance of two indices during the period under reference. However, the study revealed that the Islamic index yielded positive abnormal returns in the bull market period, but it had underperformed the FTSE All-World index in the bear market period. Using cointegration and causality analysis, Hakim and Rashidian (2004) [10] examined the relationship between DJIMI, Wilshire 5000 index, and the risk-free rate proxied by the three month Treasury bill from 1999-2003. The study found absence of any correlation between DJIMI and Wilshire 5000 and the three month Treasury bill rate. The study further revealed that the filtering criteria adopted to eliminate the shariah non-compliant firms leads to the development of an Islamic index with a unique risk-return characteristics which is not affected by the broad equity market movements.

Hussein and Omran (2005)[14] studied the performance of a variety of Islamic indexes by considering the impact of industry, size and economic conditions, on DJIMI returns for a period of 7 years from 1996 to 2003. The study revealed that Islamic indices offer investors with positive abnormal returns in bull period, but underperform their index counterparts in the bear period. Girard and Hassan (2005)[9] using a variety of measures such as Sharpe, Treynor, Jenson and Fama’s selectivity, net selectivity and diversification and Carhart’s (1997) four factor pricing models studied the comparative performance of Dow Jones Islamic Indices and its seven indices vis-a-vis their non-Islamic counterparts. They revealed absence of any major difference between Islamic and non-Islamic Indices with regard to their risk and return and also found that Islamic indices are correlated with their peers, and not with the MSCIAC World. Overall Sharpe and Treynor ratios revealed that Islamic indices outperformed their non-Islamic counterparts during the reference period.

Elfakhami, Hasan & Sidani studied a sample of 46 mutual funds in eight fund categories to track their performance over a period of 5 years (1997-2002)[8]. Using measures such as Sharpe, Treynor, Fama and Transformed Sharpe they revealed absence of any significant difference between the performance of Islamic mutual funds and their conventional counterparts. Contrary to this, Elfakhami & Hassan (2005)[7] while studying the performance of Islamic mutual funds found that the emerging markets fund category performed better followed by the American and the emerging market-South Africa fund categories. Further they revealed that the Asian fund category was the worst performer.

While undertaking the study regarding the performance of Islamic funds in Malaysia, Abdullah et al (2007)[2] concluded that Islamic funds performed better than the conventional funds during bearish economic conditions. On the other hand the conventional funds have shown better performance than Islamic funds during bullish conditions.

Studying the performance of Islamic funds over period of five years (2001-2006), Kraeussl and Hayat (2008)[16], estimating Jensen alphas for 59 international Islamic equity funds have found that 31 Malaysian funds considerably underperformed their respective equity market benchmarks, while the performance of 21 global funds was as good/bad as that of their respective equity benchmarks and 7 other funds significantly outperformed their market benchmarks.

Hoepner, Hussain and Rezec (2010)[3] analysed the financial performance and investment style of Islamic equity funds from twenty countries using three level Carhart Model.
Their study has revealed that Islamic funds from the six largest Islamic financial centres in the study (the GCC countries and Malaysia) outperformed international equity market benchmarks. On the contrary, Islamic fund portfolios from most other nations with less developed Islamic financial Markets significantly underperformed their benchmarks.

While trying to address the disbelief that may build up about the Islamic investment guidelines being prone to avoid selecting stocks in companies having enough liquidity and/or having highly leveraged capital structures Shaikh Salman (2010) concluded that high liquidity and/or high leverage companies can have different meanings and do not essentially result into benefits to the investee company or to its investors. Using a sample of Islamic and conventional mutual funds managed by HSBC, from January 2003 to January 2010, Hesham, Kabir and Yasser (2010) examined the risk-return behavior of Islamic funds. By employing a number of performance measures like Sharpe, Treynor, Jensen Alpha the study revealed that Islamic funds underperformed conventional funds in bullish periods, but outperformed conventional funds during both bearish as well as conditions of financial crisis.

V. HYPOTHESIS
Taking into consideration the objectives of the study, the following hypothesis is set for the study:

H1: The Returns of Shariah compliant Index are not significantly different from its index counterpart.

H2: The movements in Shariah compliant indices are by and large random and unpredictable.

H3: The Long term relationship between Shariah compliant Indices and respective Parent stock Indices is not statistically significant.

VI. MATERIALS AND METHODS
The above stated objectives & hypothesis testing has been carried out using the secondary data drawn from time series data of daily closing prices of S&P BSE 500 Shariah Index and its counterpart. To assess and compare the performance of Shariah Index with the corresponding conventional Index, monthly returns have been calculated by taking logarithmic differences of the price Index so that:

\[ R_{i,j} = \log(P_{i,j}) - \log(P_{i,j-1}) \]  

Since the Islamic indexes and their conventional counterparts are not from the same risk category, the Capital Asset Pricing Model (CAPM) will be used in order to estimate the risk-adjusted returns, which is of the form:

\[ (R_{ij} - R_{fj}) = \beta_{ij}(R_{mj} - R_{fj}) + \epsilon_{ij} \]  

Since \((R_{mij} - R_{fij})\) is the excess return on the benchmark index \(m\) in period \(t\), if beta is greater than one, this indicates that index \(i\) has higher risk than the benchmark index \(m\). Further, if alpha is positive and statistically significant, it indicates that the index \(i\) outperforms the market index \(m\). Based on Jensen measure and given \(\beta_{i,t}\) from equation (2), the risk-adjusted returns have been calculated using the following equation:

\[ \bar{R}_{ij} = R_{ij} - R_{fj} - \beta_{ij}(R_{mij} - R_{fij}) \]  

To test the null hypothesis that the monthly excess returns (market-adjusted return) over the period under study is equal to zero or more/less, the market-adjusted return is calculated as follows:

\[ MAR_{ij} = R_{ij} - R_{mij} \]  

Where \(MAR_{ij}\) is the market adjusted return for the index and is the difference of the return on Shariah Index and its corresponding benchmark Index calculated on the basis of both raw returns as well as the risk adjusted returns. In order to test the null hypothesis of no difference t test is used as variables follow students t distribution.

To investigate the long term relationship between Shariah Index and its respective benchmark Index, cointegration analysis is used, developed by Granger (1986). Firstly before testing for cointegration, stationarity of the variables under study is determined. Unit Root analysis has been employed to ensure the stationarity of the time series data and avoiding spurious results. Unit Root test also enables to identify whether the external financial shocks have temporary or permanent impact on the stock market. If time series data has unit root the impact of the shock will never die out resulting into deviation from long-run equilibrium. To examine the existence of unit root, Augmented Dickey Fuller (ADF) test used. ADF test is performed on both first and levels differences of the data series.

After analysing the stochastic properties of the series, now we see their relation over time. We rely on the theory of cointegration discussed in Engle and Granger (1987) and using the testing procedure by Johansen and Juselius (1990). We investigate
full information maximum likelihood procedure. The systems we examine are:


VI(b). PROXY FOR RISK-FREE RATE
The 3 month MIBOR is taken as a proxy for Risk-free Return and the investment alternative to equities for cash being set aside.

VI(c). PROXY FOR MARKET PORTFOLIO
To capture the risk factor, we have used world portfolio as market benchmark for both the Indices. Thus we use MSCI All country world index established by Morgan Stanley database, as an appropriate proxy for the market portfolio.

VI(d). DATA
We have used the S&P BSE 500 Shariah Index and adopted the S&P BSE 500 Index as the corresponding index. The reference period consists of 5 years monthly data i.e. June 2009-May 2014.

VII. RESULTS AND DISCUSSIONS

Table-1 presents the monthly returns of S&P BSE 500 and its Islamic index i.e., S&P BSE 500 Shariah. A close introspection at table reveals that both the Indices have yielded positive returns during period under study. However it can be seen from the table that S&P BSE 500 Shariah has performed relatively inferior by yielding more negative monthly mean returns then its respective Conventional Index. When the Two Indexes are compared on the basis of volatility shown, it is found that Islamic Index is displaying far less standard deviation of .0178 then its counterpart Index with .0022 indicating the low risk nature of Islamic Index. Since the Islamic Index and its counterpart is not from the same category of risk, so to analyze the risk involved in the sample Indices and whether Islamic Index outperforms market Index we have used CAPM model to estimate risk adjusted returns of the Indices (as shown in equation-2). The results of OLS estimation has been presented in table 2. It can be seen that the beta of both S&P BSE 500 Shariah and the conventional Index is much lower than 1 which indicates that the Indices are less risky than the Benchmark Index (MSCI AC Index). Also the low risk nature of Indices is confirmed by significance at 1% level. However when the S&P BSE 500 Shariah is compared to its counterpart, it can be seen that Islamic index is less risky than the Conventional index. Further we can see from Table 2 that Alpha is negative but statistically insignificant for both the Islamic as well as Conventional Index.

This is indicative of the fact that the Islamic Index does not provide any marginal returns over benchmark Index. With regard to risk, the Islamic Index is less risky than the counterpart Index as its beta is low at 0.594 as compared to 0.745 in case of the counterpart Index. This is a somewhat surprising result as one would expect the S&P BSE 500 as a more diversified market basket of stocks than the more restrictive Islamic index. This is substantiated by R² statistic which shows variations in the return of Index. It can be seen from the above table that R² is not very high for both the indices, which indicates that the movement of the S&P BSE 500 Indices is quite different from that of global market. Since the S&P BSE 500 Shariah and S&P BSE 500 do not consist of similar type of companies, thus are likely to differ in risk. As such to draw the meaningful conclusions about the performance of the sample Islamic Index compared to its counterpart Index, it becomes important to calculate Risk-adjusted returns. Using OLS estimation, risk adjusted returns of the Indices under study have been calculated which are presented in table 3. A close introspection of the risk-adjusted returns of the sample Indices reveals that both the Indices yield negative monthly mean returns. Performance shown by Islamic Index is relatively inferior to that of conventional Index. In order to test whether excess monthly returns (abnormal returns) of the Islamic Index are equal to zero, we have used parametric t-test. The results based on Market adjusted returns and Jensen Model are reported in table-4.

A close introspection of the data presented in table-4 reveals that excess returns on Islamic Index is although negative but not significantly different from that of its counterpart Index during the reference period. As such it can be safely concluded from the data presented in table 4 that there is no significant difference in the monthly excess returns of Islamic index and its counterpart.

In order to check the stochastic properties of the S&P BSE 500 Shariah index, results for unit root test are presented in Table 5. The results of ADF test reveal that S&P BSE 500 Shariah Index is non stationary and hence the movements of the Index are random and unpredictable. This is indicative of the fact that external financial shocks have permanent impact and the market will permanently deviate from the long run. Also it is generally accepted as a sign of market efficiency.
Furthermore as expected S&P BSE 500 Index and three month MIBOR are also found to be non-stationary. Our results are in line with earlier literature on the efficiency of stock Indices and Interest rates. Thus, the results lead to acceptance of the null hypotheses that the movements in Shariah compliant indices are by and large random and unpredictable. Furthermore when the three series under study were tested for unit root after differencing them, it was found that all the three series were integrated of the order (1).

After studying the stochastic properties of the series, we further investigate if there exists a long term relationship between Islamic Index and its respective conventional index. Since the series were found to be non stationary and integrated of the order (1), we cannot use ordinary regression to test the relationship as it may generate spurious results. Hence, Cointegration test is used to investigate the long term relationship between three series. Table 6 shows the results for cointegration test between Islamic Index and the conventional Index and Interest series in three bivariate models. The results suggest that there exist two cointegration vectors in all the three cases. This indicates that Islamic index has long term relationship with both Conventional Index as well as Interest rate. Hence Islamic index and conventional Index move together in the long run and thus movement of one can be predicted by the other. In spite of the selection criteria of the stocks which comprise the index , a stochastic link exists between the Islamic index and interest which is in contrast to the findings of Hakim and Rashidian (2004)[10]. Subsequently the hypothesis of the no long term relationship between Shariah compliant Index and respective Parent stock Index is rejected at 1% level.

VIII. CONCLUSION

This paper is sought to assess the performance of the S&P BSE 500 Shariah Index in comparison with its conventional Index. Great attention has been devoted in answering the question of whether the risk is being well compensated for. To assess the performance of the Indices under study, average monthly raw returns, risk adjusted monthly returns were calculated using the time series data of daily closing prices. To gauge the risk involved in the two categories of Indices beta and standard deviation has been used. Also to test the hypotheses, parametric t test has been used. Also to address the question if there exists long term relationship between Islamic Index and its counterpart index, cointegration analysis has been used.

The estimation has revealed that Islamic Index has slightly underperformed unscreened index during the period under study on the basis of raw as well as risk adjusted returns. However, Islamic Index was found carrying significantly less risk than MSCI AC world index. Also the Islamic Index was found to be less risky than its counterpart Index. However the hypothesis testing has resulted into the acceptance of the hypothesis that the returns of Shariah complaint index are not significantly different from its counterpart Index. Furthermore Cointegration analysis revealed that Islamic index and its conventional index exhibit a long term relationship.

APPENDIX

Table-1: Average Monthly Raw Returns of S&P BSE 500 indices

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P BSE 500</td>
<td>-0.0448</td>
<td>0.0364</td>
<td>0.00359</td>
<td>0.017859</td>
<td>-0.397</td>
<td>-0.058</td>
</tr>
<tr>
<td>BSE 500</td>
<td>-0.0480</td>
<td>0.0544</td>
<td>0.00374</td>
<td>0.022788</td>
<td>-0.061</td>
<td>-0.399</td>
</tr>
</tbody>
</table>

Source: All the above measures have been calculated using the time series data obtained from the official website of S&P equity Indices.
Table-2: OLS Estimation

<table>
<thead>
<tr>
<th>Index</th>
<th>Alpha</th>
<th>Beta</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P BSE 500 Shariah</td>
<td>-0.0014</td>
<td>0.594</td>
<td>0.394</td>
</tr>
<tr>
<td></td>
<td>(0.45)</td>
<td>(&lt;0.001)***</td>
<td></td>
</tr>
<tr>
<td>S&amp;P BSE 500</td>
<td>-0.0009</td>
<td>0.745</td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td>(0.35)</td>
<td>(&lt;0.001)***</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Three asterisks indicate significance at the 1 percent level.
Source: All the above measures have been calculated using the time series data obtained from the official website of MSCI & S&P global equity Indices.

Table-3: Risk Adjusted Return of S&P BSE 500 Indices

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P BSE 500 Shariah</td>
<td>-0.0514</td>
<td>0.0289</td>
<td>-0.0014</td>
<td>0.0141</td>
<td>-0.631</td>
<td>1.825</td>
</tr>
<tr>
<td>S&amp;P BSE 500</td>
<td>-0.0545</td>
<td>0.0352</td>
<td>-0.0009</td>
<td>0.0181</td>
<td>-0.127</td>
<td>0.435</td>
</tr>
</tbody>
</table>

Source: All the above measures have been calculated using the time series data obtained from the official website S&P equity Indices.

Table-4: Mean Abnormal Monthly Returns for the Islamic Indices

<table>
<thead>
<tr>
<th></th>
<th>Market Adjusted</th>
<th>Jensen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Abnormal Return</td>
<td>-0.0001</td>
<td>-0.0006</td>
</tr>
<tr>
<td>t- statistics</td>
<td>-0.105</td>
<td>-0.420</td>
</tr>
<tr>
<td>p- value</td>
<td>0.917</td>
<td>0.616</td>
</tr>
</tbody>
</table>

Source: All the above measures have been calculated using the time series data obtained from the official website of S&P equity Indices.

Table-5: Test for Unit Roots

<table>
<thead>
<tr>
<th>ADF Test Statistics</th>
<th>Levels</th>
<th>1st Differences</th>
<th>5% Critical value</th>
<th>10% Critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P BSE 500 Shariah</td>
<td>-0.973463(.7572)</td>
<td>-9.146098 (.0000)</td>
<td>-2.911730</td>
<td>-2.593551</td>
</tr>
<tr>
<td>S&amp;P BSE 500</td>
<td>-1.708308(.4219)</td>
<td>-7.795418 (.0000)</td>
<td>-2.911730</td>
<td>-2.593551</td>
</tr>
<tr>
<td>MIBOR</td>
<td>-2.010176( 0.2818)</td>
<td>-8.868020 (.0000)</td>
<td>-2.911730</td>
<td>-2.593551</td>
</tr>
</tbody>
</table>

Source: All the above measures have been calculated using the time series data obtained from the official website of S&P equity Indices.
Table 6: Test for Cointegration (Included observations: 55 after adjustments)

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Number of Cointegrating Vectors</th>
<th>Eigenvalue</th>
<th>Trace Static</th>
<th>0.05 Critical value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P BSE 500 SHARIAH, S&amp;P BSE 500</td>
<td>None</td>
<td>0.333655</td>
<td>33.43180</td>
<td>15.49471</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>At most 1</td>
<td>0.182826</td>
<td>11.10465</td>
<td>3.841466</td>
<td>0.0009</td>
</tr>
<tr>
<td>S&amp;P BSE 500, MIBOR</td>
<td>None</td>
<td>0.262285</td>
<td>28.79229</td>
<td>15.49471</td>
<td>0.0003</td>
</tr>
<tr>
<td></td>
<td>At most 1</td>
<td>0.196918</td>
<td>12.06144</td>
<td>3.841466</td>
<td>0.0005</td>
</tr>
<tr>
<td>S&amp;P BSE 500, SHARIAH, MIBOR</td>
<td>None</td>
<td>0.286980</td>
<td>28.22160</td>
<td>15.49471</td>
<td>0.0004</td>
</tr>
<tr>
<td></td>
<td>At most 1</td>
<td>0.160437</td>
<td>9.618043</td>
<td>3.841466</td>
<td>0.0019</td>
</tr>
</tbody>
</table>

Source: All the above measures have been calculated using the time series data obtained from the official website of S&P equity Indices.

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