

# A Study of Islamic Stock Indices and Macroeconomic Variables

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**Abstract**—The purpose of this paper is to investigate the relationship among the key macroeconomic variables and Islamic stock market in India. This study is based on the time series data of financial years 2009-2015 to explore the consistency of relationship between macroeconomic variables and Shariah Indices. The ADF (Augmented Dickey–Fuller Test Statistic) and PP (Phillips–Perron Test Statistic) tests are employed to check stationarity of the data. The study depicts the long run relationship between Shariah indices and macroeconomic variables by using the Johansen Co-integration test. BSE Shariah and Nifty Shariah have uni-direct Granger causality. The outcome of VECM is significantly confirming the applicability of best fitted model. Thus, Islamic stock indices are proficiently working for the development of Indian economy. It suggests that by keeping eyes on Islamic stock market which will be more interactive in the future with other macroeconomic variables.

**Keywords**—Indian shariah indices, macroeconomic variables, co-integration, Granger causality, Vector error correction model.

**JEL Classification**—C32, E4, E31, P43.

## I. INTRODUCTION

RECENTLY, the researchers have focused their attention on the emerging financial market, especially Shariah Indices in India. Islamic stock markets have provided attractive investment opportunities to international investors, and have become investment emblem in the global financial markets. Return in Islamic stock market is high as compared to benchmark indices (Sensex and Nifty) in India. Today, the information technology has bought the revolution in the field of Islamic research and innovation by providing the database and the various tools to analyze the data on various aspects of the economy. The combined effect of LPG policy and the information technology have converged the world into a single market. The macroeconomic fundamental variables also change due to favorable or adverse information in the market, this information are strike, war, unsuitable economic growth, terrorist attacks etc. On other hand, news of safety, liberal economic policies, robustness infrastructure by government leads to the favorable impact over the investment results. The relationship between macroeconomic variables and stock market has been discussed in [1]. At first instance, stock market provides an investor an inflation free market and at the same time it contributes towards the development of the economy [2]. S&P short lists the companies which are suitable

for being listed in index according to the Shariah law. Basically, the objective of the Shariah index is the wealth maximization and economic growth. In Feb. 2008, Shariah Indices have been launched first time with partnership of S&P and India Index services and products. There are two Shariah indices in Nifty – S&P CNX 500 Shariah and S&P CNX Nifty Shariah. In 2008, BSE TASI Shariah 50 was working under the umbrella of TASI (Taqwa Advisory Shariah Investment Solution). And after 1<sup>st</sup> May, 2013, BSE collaborated S&P Dow Jones Indices have been launched as S&P BSE 500 Shariah Index in India [3]. The annualized return of S&P BSE 500 Shariah index has decreased from 88.50% to 48.70% at the rate -2.28 (CAGR) per year, GDP has decreased from 8.51% to 7.40% at the rate -9.45 (CAGR) during 2009-2015. But for the period of 2009-2010, GDP has increased from 8.50% to 10.5% while annualized return of S&P BSE 500 Shariah index has decreased from 88.50% to 14.09% [4]. Contrary to conventional wisdom there is surprise finding, when single rate of gross domestic product (GDP) growth is incompatible with solid double digit stock market gains. The annualized return S&P BSE 500 Shariah Index 48.7% while GDP was 7.4% growth in Feb, 2015. Finally, highest recorded annualized return of S&P BSE 500 Shariah was 49% in March, 2015 in comparison with benchmark indices (Sensex) 41 percent [5]. Those Shariah Index are working under the supervision of Nifty, includes Nifty Shariah, CNX Shariah 500 and Shariah 25 [6]. There all indices are prominently working as S&P BSE Shariah 500. Goldman Sachs has forecasted that Global Investment Bank, in 2035 India would be the third biggest economy of the world after US and China [7].

### A. Macroeconomic Variables

This research study is carry forwarded to the macroeconomic which is dealing with performance, behavior, structure and decision making an economy as whole, rather than the individual market. This paper investigates only four major variables include consumer price index (CPI), money supply (MON), interest rate (INT) and exchange rate (ER). This study is focused on the Islamic stock indices and macroeconomic variables. Islamic stock market is an emerging term in India. There are several factors affecting the growth rate of Islamic stock market like government intervention, religious values, regulatory authorities, politics and many superstitious conditions.

### B. Islamic Stock Market in India

Shariah is Islamic canonical law, which provides the guideline to investors, Shariah is differentiating the

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permissible and non-permissible business according to the Quran and Sunna. Based on these, investors can freely invest their money in the stock market. Shariah Index is an index of companies that followed the stringent rules of Shariah law board. Basically, Shariah law boards screen the companies by two ways; sectoral screening and financial screening, after that those companies were liable to join the Shariah Index. Standard & Poor (S&P) is an international financial services company which provides consultancy and filters the companies complying with the Shariah principles.

#### *Objective of the Study*

- To investigate the association between Islamic Stock Indices and macroeconomic variables.

## II. LITERATURE REVIEW

The main objective of this study is to explore the linkage between the emerging Islamic stock markets and macroeconomic variables. Shariah Indices have included S&P BSE 500 Shariah Index, Nifty Shariah Index, CNX 500 Shariah and Shariah 25 respectively. Macroeconomic variables used for this study include CPI, INT, MON and EX in India.

The literature of Islamic finance is very scarce and mostly Islamic finance papers are theoretical rather than empirical studies. This constrains the possibility of finding many studies examining the Shariah indices.

Rashid determined that the macroeconomic variable investors' sentiment somewhat depends upon the Islamic stock market. This study has opened the new potential for Islamic investors in the industries. FTSE Bursa Malaysia index is influenced by macroeconomic variable. This study has significant impact on demands of Shariah compliant capital market for the Muslim investors. Bursa Malaysia index is reducing the rumor based transaction system from financial market [8].

Irfan focused on the causal relationship between Shariah index and macroeconomic variables. There exists co-integration of Shariah Index and ER. The granger causality test revealed that there is bi-directional relationship between all variable except IR and Shariah, and unidirectional relationship i.e. Interest rate (IR) does not cause to Shariah index. There exists a long term relationship between Shariah index and macroeconomic variables [9].

Naseri and Masih examine the causality between Shariah indices and three macroeconomic variables from Malaysia. This paper examined the long-term relationships between Islamic stock market and selected macroeconomic variables including MON, CPI and ER. The function is tested by CUSUM and CUSUM SQUARE. There was long run association between Islamic Stock indices and macroeconomic variables. Macroeconomic variables influenced the Islamic stock market [10].

Hussein and Omran focused on the interrelationship between oil price, ER, and Islamic returns of Malaysian Stock market. The indices measured for the study were FTSE Bursa Malaysia and EMAS Shariah index and it was proven that

there exists a strong correlation between the oil price and stock prices in the Malaysian Stock index [11].

The results expressed that the KLSI has negative impact on the INT. And also DJIMI has negative impact on the INT. Basically the aim of this study is to know the impact of monetary policy on the Islamic stock indices. This study focused the GARCH Model, the result found that monetary variables were significant in influencing KLCI volatility, while MON, inflation rate and INT affected DDJINA Volatility [12].

This study attempted vector auto-regression (VAR) model to explore the dynamic relationship between stock prices and macroeconomic variables for the case of Malaysia. The results of the analysis suggested the existence of a long run and short run relationship between these fundamental economic factors and the stock prices. They also acknowledged that the stock market is performing somewhat prognostic role for the macroeconomic fundamentals. This study [13] focused on importance of the lead and lag association between Malaysian stock market and macroeconomic variables. This study is based on the data for the time period of 1981 to 1994. This study includes five macroeconomic fundamentals namely MON, GDP, CPI, INT and ER. The analysis of outcomes indicated that stock prices leads to nominal income, the CPI and INT, but MON and INT to lead stock prices [13].

The research of Maysami and Koh in analogous attempt concluded that such associations do exist in Singapore. The outcome has shown that inflation and MON have short as well as long term interactions with Singapore's stock market [14].

Mukherjee conducted a study by using the Johansen's VECM, the investigators analyzed the linkage between Japanese Stock Market and macro-economic variables likes, exchange rate (ER), inflation, MON, real economic activity, long-term government bond rate, and call money rate. The Granger causal relationship was conducted in this study; the result shows the unidirectional relationship between variables and Japanese stock market. The results concluded that a long run co-integration existed between stock market prices and macroeconomic variables [15].

## III. METHODOLOGY

### *A. Data Sources*

This study is restricted to Indian Islamic Stock market and macroeconomic variables only. The data for the succeeding research are spread over the 72-month observations ranging from April 2009 to March 2015. Indian Shariah indices are used for this study i.e., S&P BSE 500 Shariah, Nifty Shariah, CNX 500 Shariah and Shariah 25. Shariah Indices are mainly retrieved from BSE, NSE and Asian index websites.

Macroeconomic variables data have been retrieved from RBI (Reserve Bank of India) website. CPI data are collected from Ministries/Department of India website. Interest rate data have been collected from economic research (Fred economic data). Money & supply (MON) data are retrieved from RBI handbook. ER data are obtained from RBI handbook.

*B. Tools and Techniques*

As per the objectives, the study is based on time series data. Eviews has been employed. First, we used unit root test to check the stationarity of data, with the help of PP test (Phillips–Perron Test Statistic) and ADF test (Augmented Dickey–Fuller Test Statistic). Johansen test co-integration between Shariah indices (S&P BSE 500 Shariah, Nifty Shariah, CNX 500 Shariah and Shariah 25) and macroeconomic variables has been investigated for long term. The Engle Granger test identified the causal relationship. Shariah Indices and macroeconomic variables have bi-directional causality. The Vector Error Correction Mechanism (VECM) is an approach to find out the causal relationship between the co-integrated variables.

## IV. EMPIRICAL RESULTS

All empirical analysis of data has been taken from the April 2009 to March 2015 with 72 points of observation.

In this study, daily returns are used without any adjustment for dividends computed by using the log formula [16]. First, investigator converts all variables time series data into log return.

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

Table I shows the summarized data in meaningful ways such that all variables are re-jigging statistics. Skewness of the distribution of all macroeconomic variables and Islamic capital market data are positively right skewed that means number of high values are more in comparison to low values in the time series data. The findings of kurtosis show that all variable values are greater than 3 that means leptokurtic distribution, sharper than the normal distribution. MON is 2.3428, which is less than 3, which means MON data series have platykurtic distribution flatter than a normal distribution. The volatility of variables is in terms of standard deviation (SD) as percentage (%) of means highest in INT (7.9%) and lowest in CPI (0.9%), which means INT is highly volatile in comparison to all variables. As per Jarque-Bera statistics (JB-test), Islamic indices and macroeconomic variables (CPI, INT) are non-normal at the confidence interval of 95%, since probabilities are less than 0.05. So, it is also needed to convert the S&P BSE Shariah index series into the return series. But MON and ER probabilities are more than 0.05. So, JB statistic shows that series of MON and ER are about to the normal distribution.

TABLE I  
DESCRIPTIVE STATISTICS

Particulars	BSE Shariah	NIFTY Shariah	CNX 500 Shariah	Shariah 25	CPI	INT	MON	EX
Mean	0.0110	0.0119	0.0146	0.0152	0.0074	0.0092	0.0108	0.0031
Median	0.0111	0.0123	0.0169	0.0131	0.0062	0.0000	0.0092	0.0027
Maximum	0.1406	0.1618	0.3680	0.1629	0.0447	0.2552	0.0303	0.0597
Minimum	-0.0892	-0.0907	-0.3338	-0.0828	-0.0166	-0.1933	-0.0051	-0.0564
Std. Dev.	0.0369	0.0412	0.0756	0.0409	0.0092	0.0798	0.0079	0.0230
Skewness	0.1168	0.4518	0.1520	0.5319	0.4419	0.4511	0.4583	0.1184
Kurtosis	4.5461	4.7723	14.2976	5.0267	6.3959	4.7588	2.3428	3.2398
Jarque-Bera	7.2330	11.708	377.859	15.499	36.427	11.5589	3.7629	0.3359
Probability	0.0269	0.0029	0.0000	0.0004	0.0000	0.0031	0.1524	0.8454
Sum	0.7776	0.8452	1.0350	1.0764	0.5267	0.6539	0.7648	0.2211
Sum Sq. Dev.	0.0952	0.1191	0.4003	0.1173	0.0059	0.4460	0.0044	0.0369
Observations	72	72	72	72	72	72	72	72

TABLE II  
CORRELATION MATRIX

Particulars	BSE Shariah	NIFTY Shariah	CNX 500 Shariah	Shariah 25	CPI	INT	MON	EX
BSE Shariah	<b>1.0000</b>							
NIFTY Shariah	-0.0565	<b>1.0000</b>						
CNX 500 Shariah	-0.0260	0.5354	<b>1.0000</b>					
Shariah 25	-0.0586	0.9777	0.5150	<b>1.0000</b>				
CPI	0.1268	0.1178	0.1376	0.1436	<b>1.0000</b>			
INT	-0.2063	-0.0316	-0.0884	-0.0719	-0.1086	<b>1.0000</b>		
MON	-0.0500	-0.0807	-0.0381	-0.0629	0.0409	-0.0186	<b>1.0000</b>	
EX	0.0342	-0.3771	-0.2015	-0.4040	0.0696	0.0777	-0.1734	<b>1.0000</b>

Table II shows the correlation matrix between Islamic stock indices and macroeconomic variables over April 2009 to March 2015. BSE and NSE Shariah Indices have moderate downhill (negative) linear relationship. But, all NSE Shariah Indices have highly (positive) and moderate uphill (positive) relationship exists. CPI is one of the most important factors in

this correlation matrix because CPI has the positive correlation with all Islamic stock indices [17].

Table III shows the PP test statistic, in which T-test statistic more than critical values, then investigator can reject the null hypothesis and accept the alternative hypothesis. T-test statistic is more than 1%, 5% and 10% level of critical value. P-value (Probability value) is less than 5% and the coefficient

should be negative. All these three assumptions are followed by Islamic Stock indices and macroeconomic variables. PP test has been checked in Model 1 (level) on intercept and trend & intercept.

Model 2 (1<sup>st</sup> difference) is also checked the stationarity of data on intercept and trend & intercept both, all variables time series are stationary, which are ready to use for the further test of statistic.

TABLE III  
UNIT ROOT TEST ON VARIABLES PP TEST

Variables	Models	Phillips-Perron Test Statistic						
		t-Statistic	Prob.*	Coefficient	1% level	5% level	10% level	
BSE Shariah	M1	Intercept	-7.9189	0.0000	-0.9572	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-8.4715	0.0000	-1.0309	-4.0946	-3.4753	-3.1650
	M2	Intercept	-34.0799	0.0000	-1.4367	-3.5285	-2.9042	-2.5896
		Trend & Intercept	-34.0391	0.0001	-1.4367	-4.0966	-3.4763	-3.1656
Nifty Shariah	M1	Intercept	-9.0344	0.0000	-0.9710	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-8.9524	0.0000	-0.9693	-4.0946	-3.4753	-3.1650
	M2	Intercept	-13.5050	0.0001	-1.4582	-3.5285	-2.9042	-2.5896
		Trend & Intercept	-14.5932	0.0000	-1.4638	-4.0966	-3.4763	-3.1656
CNX 500 Shariah	M1	Intercept	-11.7170	0.0000	-1.4795	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-11.4275	0.0000	-1.4899	-4.0946	-3.4753	-3.1650
	M2	Intercept	-22.8276	0.0001	-1.9948	-3.5285	-2.9042	-2.5896
		Trend & Intercept	-22.9400	0.0001	-1.9895	-4.0966	-3.4763	-3.1656
Shariah 25	M1	Intercept	-8.5754	0.0000	-0.9256	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-8.5273	0.0000	-0.9236	-4.0946	-3.4753	-3.1650
	M2	Intercept	-14.9449	0.0001	-1.4798	-3.5285	-2.9042	-2.5896
		Trend & Intercept	-13.8229	0.0001	-1.4873	-4.0966	-3.4763	-3.1656
CPI	M1	Intercept	-6.7143	0.0000	-0.7983	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-7.0564	0.0000	-0.8497	-4.0946	-3.4753	-3.1650
	M2	Intercept	-25.4407	0.0001	-1.3865	-3.5285	-2.9042	-2.5896
		Trend & Intercept	-25.1129	0.0001	-1.3866	-4.0966	-3.4763	-3.1656
MON	M1	Intercept	-10.5531	0.0001	-1.2064	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-13.0840	0.0001	-1.2243	-4.0946	-3.4753	-3.1650
	M2	Intercept	-52.0352	0.0001	-1.6165	-3.5285	-2.9042	-2.5896
		Trend & Intercept	-54.5237	0.0001	-1.6167	-4.0966	-3.4763	-3.1656
INT	M1	Intercept	-9.5924	0.0000	-1.1296	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-9.6781	0.0000	-1.1516	-4.0946	-3.4753	-3.1650
	M2	Intercept	-38.2112	0.0001	-1.4819	-3.5285	-2.9042	-2.5896
		Trend & Intercept	-40.9088	0.0001	-1.4825	-4.0966	-3.4763	-3.1656
EX	M1	Intercept	-6.2541	0.0000	-0.7113	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-6.2476	0.0000	-0.7205	-4.0946	-3.4753	-3.1650
	M2	Intercept	-19.6701	0.0001	-1.2807	-3.5285	-2.9042	-2.5896
		Trend & Intercept	-19.7251	0.0001	-1.2817	-4.0966	-3.4763	-3.1656

Table IV shows that the ADF test statistic, the T-test statistic is more than critical values, then investigator can reject the null hypothesis and accept the alternative hypothesis. All these assumptions are allowing the ADF test for the stationary. These assumptions should be followed by the ADF test. T-test Statistic is more than its tested critical value at 1%, 5% and 10% level of significance. P-value (Probability value) is less than 5%. And the coefficient should be negative. These assumptions are pursued by Indian Islamic Stock indexes and macroeconomic variables. This ADF test has been checked in Model 1 (level) on intercept and trend & intercept. Model 2 checked (first difference) with intercept and trend & intercept both. Model 1 & 2 proved that the time series of all variables are stationary, these time series are ready to be used in the Johansen test of statistic [18]. The results are shown in Table V. An empirical outcome of trace statistic indicates the rejection of the null hypothesis at 0.05 critical

value; it presents that there is no co-integration vector. On other hand, S&P BSE 500 Shariah index has long relationship with Marco variables. The Trace statics indicates 2 Co-integration equation at 5% level of significance. It shows that the long run equilibrium between Shariah Indices and selected Macro variables includes CPI, MON, IR and ER. The results of Max-Eigen statistic point out the rejection of null hypothesis at 0.05 critical values; there is no co-integration vector. BSE Shariah has long association with Marco variables. Max-Eigen Statistic also indicates that there is 1 Co-integration equation at 5% level of significance. It tells about long run stability between Indian Islamic capital market indices and selected Macro economic variables.

TABLE IV  
UNIT ROOT TEST ON VARIABLES ADF TEST

Variables	Models	Augmented Dickey–Fuller Test Statistic						
		t-Statistic	Prob.*	Coefficient	1% level	5% level	10% level	
BSE Shariah	M1	Intercept	-7.8972	0.0000	-0.9572	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-8.4490	0.0000	-1.0309	-4.0946	-3.4753	-3.1650
	M2	Intercept	-7.6916	0.0000	-3.2503	-3.5332	-2.9062	-2.5906
		Trend & Intercept	-7.6228	0.0000	-3.2526	-4.1032	-3.4794	-3.1674
Nifty Shariah	M1	Intercept	-8.9069	0.0000	-0.9710	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-8.8138	0.0000	-0.9693	-4.0946	-3.4753	-3.1650
	M2	Intercept	-13.5636	0.0001	-2.2287	-3.5300	-2.9048	-2.5899
		Trend & Intercept	-13.5031	0.0001	-2.2429	-4.0987	-3.4773	-3.1662
CNX 500 Shariah	M1	Intercept	-11.5360	0.0001	-1.4795	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-11.3568	0.0000	-1.4899	-4.0946	-3.4753	-3.1650
	M2	Intercept	-10.3098	0.0000	-4.1390	-3.5316	-2.9055	-2.5903
		Trend & Intercept	-10.2343	0.0000	-4.1396	-4.1009	-3.4783	-3.1668
Shariah 25	M1	Intercept	-8.5023	0.0000	-0.9256	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-8.4279	0.0000	-0.9236	-4.0946	-3.4753	-3.1650
	M2	Intercept	-13.0504	0.0000	-2.2284	-3.5300	-2.9048	-2.5899
		Trend & Intercept	-13.0659	0.0001	-2.2531	-4.0987	-3.4773	-3.1662
CPI	M1	Intercept	-6.7143	0.0000	-0.7983	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-7.0489	0.0000	-0.8497	-4.0946	-3.4753	-3.1650
	M2	Intercept	-6.6101	0.0000	-8.3556	-3.5461	-2.9117	-2.5936
		Trend & Intercept	-6.4775	0.0000	-8.3208	-4.1213	-3.4878	-3.1723
MON	M1	Intercept	-10.1633	0.0001	-1.2064	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-10.2899	0.0000	-1.2243	-4.0946	-3.4753	-3.1650
	M2	Intercept	-6.5105	0.0000	-11.1460	-3.5461	-2.9117	-2.5936
		Trend & Intercept	-6.4545	0.0000	-11.2894	-4.1213	-3.4878	-3.1723
INT	M1	Intercept	-9.4313	0.0000	-1.1296	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-8.1985	0.0000	-1.4567	-4.0966	-3.4763	-3.1656
	M2	Intercept	-7.2576	0.0000	-4.8634	-3.5349	-2.9069	-2.5910
		Trend & Intercept	-7.2617	0.0000	-4.9110	-4.1055	-3.4805	-3.1680
EX	M1	Intercept	-6.2350	0.0000	-0.7113	-3.5270	-2.9036	-2.5892
		Trend & Intercept	-6.2240	0.0000	-0.7205	-4.0946	-3.4753	-3.1650
	M2	Intercept	-7.3071	0.0000	-2.3674	-3.5332	-2.9062	-2.5906
		Trend & Intercept	-7.2502	0.0000	-2.3693	-4.1032	-3.4794	-3.1674

TABLE V  
JOHANSEN'S CO-INTEGRATION TEST OF BSE SHARIAH

Hypothesized No. of CE(s)	Trace Statistic				Hypothesized No. of CE(s)	Max-Eigen Statistic			
	Eigen value	Trace Statistic	Critical Value 0.05	Prob.**		Eigen value	Max-Eigen Statistic	Critical Value 0.05	Prob.**
None *	0.4282	87.9564	69.8189	0.0009	None *	0.4282	36.8863	33.8769	0.0212
At most 1 *	0.3212	51.0701	47.8561	0.0242	At most 1	0.3212	25.5724	27.5843	0.0885
At most 2	0.2380	25.4977	29.7971	0.1444	At most 2	0.2380	17.9426	21.1316	0.1320
At most 3	0.0987	7.5552	15.4947	0.5141	At most 3	0.0987	6.8577	14.2646	0.5061
At most 4	0.0105	0.6975	3.8415	0.4036	At most 4	0.0105	0.6975	3.8415	0.4036

TABLE VI  
JOHANSEN'S CO-INTEGRATION TEST OF NIFTY SHARIAH

Hypothesized No. of CE(s)	Trace Statistic				Hypothesized No. of CE(s)	Max-Eigen Statistic			
	Eigen value	Trace Statistic	Critical Value 0.05	Prob.**		Eigen value	Max-Eigen Statistic	Critical Value 0.05	Prob.**
None *	0.4022	97.7318	69.8189	0.0001	None *	0.4022	33.9620	33.8769	0.0489
At most 1 *	0.3221	63.7698	47.8561	0.0008	At most 1	0.3221	25.6611	27.5843	0.0863
At most 2 *	0.2437	38.1087	29.7971	0.0044	At most 2	0.2437	18.4313	21.1316	0.1145
At most 3 *	0.2293	19.6774	15.4947	0.0110	At most 3 *	0.2293	17.1942	14.2646	0.0167
At most 4	0.0369	2.4831	3.8415	0.1151	At most 4	0.0369	2.4831	3.8415	0.1151

Table VI shows that summary results of Johansen Co-integration test, it is observed that trace statistic indicates the

rejection of null hypothesis at 5% critical values, it presents that there is no co-integration vector. In other terms, Nifty

Shariah Index has long relationship with Macroeconomic variables. Trace statistic indicates 4 co-integration equation at 0.05 levels of significance. It shows long run equilibrium between Nifty Shariah Index and selected Macro variables. The results of Max-Eigen statistic reflect the rejection of null hypothesis at 0.05 critical values. It represents that there are no co-integration vectors. Nifty Shariah Index has long relationship with Macroeconomic variables like, CPI, MON, INT and ER. Max-Eigen Statistic also points out the 1 co-integration equation at 0.05 levels of significance. There is long run equilibrium linkage between Nifty Shariah Index and selected Macroeconomic variables.

Table VII shows the results of Johansen co-integration test statistics. An empirical result of trace test indicates the rejection of null hypothesis at 5% critical values i.e. it shows

no co-integration vector. CNX 500 Shariah has long relationship with Marco variables. Trace test also indicates 4 co-integration equations at 0.05 levels of significance, presents long run equilibrium between CNX 500 Shariah and selected Macro variables including CPI, MON, IR and ER. The results of Max-Eigen statistic designate the rejection of null hypothesis at 5% critical values. In other words, CNX 500 Shariah has long relationship with Marco variables. Max-Eigen value test indicates no co-integration at the 0.05 level, and Max-Eigen statistic is less than the critical value of 5% level of significant, it tells that there is no long run equilibrium between CNX 500 Shariah and selected Macroeconomic variables. In this case, Johansen co-integration statistic is going to in favor of trace statistic; Trace test has 4 co-integration equations with 5% level of significance.

TABLE VII  
JOHANSEN'S CO-INTEGRATION TEST OF CNX 500 SHARIAH

Trace Statistic					Max-Eigen Statistic				
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	Critical Value 0.05	Prob.**	Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	Critical Value 0.05	Prob.**
None *	0.3908	94.3531	69.8189	0.0002	None	0.3908	32.7151	33.8769	0.0683
At most 1 *	0.3175	61.6380	47.8561	0.0015	At most 1	0.3175	25.2108	27.5843	0.0977
At most 2 *	0.2664	36.4272	29.7971	0.0074	At most 2	0.2664	20.4431	21.1316	0.0622
At most 3 *	0.1968	15.9841	15.4947	0.0422	At most 3 *	0.1968	14.4678	14.2646	0.0464
At most 4	0.0227	1.5163	3.8415	0.2182	At most 4	0.0227	1.5163	3.8415	0.2182

TABLE VIII  
JOHANSEN'S CO-INTEGRATION TEST OF SHARIAH 25

Trace Statistic					Max-Eigen Statistic				
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	Critical Value 0.05	Prob.**	Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	Critical Value 0.05	Prob.**
None *	0.3948	93.9292	69.8189	0.0002	None	0.3948	33.1410	33.8769	0.0610
At most 1 *	0.3087	60.7881	47.8561	0.0019	At most 1	0.3087	24.3680	27.5843	0.1224
At most 2 *	0.2608	36.4201	29.7971	0.0075	At most 2	0.2608	19.9439	21.1316	0.0726
At most 3 *	0.1902	16.4762	15.4947	0.0355	At most 3	0.1902	13.9275	14.2646	0.0564
At most 4	0.0379	2.5487	3.8415	0.1104	At most 4	0.0379	2.5487	3.8415	0.1104

TABLE IX  
ESTIMATES OF NORMALIZED CO-INTEGRATING COEFFICIENTS

<b>BSE Shariah</b>	<b>= 0.290 - 0.978CPI + 1.35INT - 26.31MON - 0.669ER</b>
<b>CNX Shariah</b>	<b>= 0.109 + 2.060CPI + 0.365INT - 10.692MON - 1.719ER</b>
<b>Nifty Shariah</b>	<b>= 0.100 + 2.209CPI + 0.416INT - 10.122MON - 0.378ER</b>
<b>Shariah 25</b>	<b>= 0.121 + 1.777CPI + 0.451INT - 11.557MON - 0.477ER</b>

Performance of Johansen co-integration test (Table VIII) is an empirical result of the trace test statistic. It indicates the rejection of null hypothesis at 5% critical values, meaning that there is no co-integration vector. Shariah25 has long relationship with Macroeconomic variables including CPI, MON, IR and ER. Trace test also indicates 4 Co-integration equations at 0.05 levels of significance, it presents the long run equilibrium between Shariah25 and selected macroeconomic variables. The outcome of Max-Eigen statistic indicates the refusal of null hypothesis at 0.05 critical value, meaning that there is no co-integration vector. Max-Eigen statistic is less than the critical value of 5% level of significance. It tells that there is no long run equilibrium between Shariah25 and Macroeconomic variables. In this case, Johansen co-integration statistic is going into the favor of trace

statistic. Trace test has 4 co-integration equations with 5% level of significant.

The estimates of vectors error correction model consisting of the estimates of normalised Co-integrating coefficients, and the estimates of error correction coefficients along with their respective standards error, t-statistics are shown in equation. Investigator can, therefore, write the co-integration relationship.

BSE Shariah Index (Table IX) has only one co-integration with money & supply. It shows the t-statistics of MON (26.31), which is greater than critical value (1.96 at 0.05 Levels of significance). It exposes that null hypothesis is rejected i.e. MON is co-integrated to BSE Shariah Index. CNX Shariah has two co-integrations. It shows the t-statistics of CPI, MON (2.060, 10.692, respectively), which is greater

than critical value (1.96 at 5% Level of significance). It tells that the null hypothesis is rejected i.e. CPI, MON are co-integrated to CNX Shariah Index. Other way Nifty Shariah Index has co-integrated with CPI and MON. The outcome of Shariah 25 has integrated with money and supply (MON).

The result of Granger causality test shows that there is unidirectional relationship between BSE Shariah and Nifty Shariah, BSE Shariah and Shariah 25, Shariah 25 and CNX Shariah, CNX Shraiah and ER, INT and CPI. There is bi-directional relationship between INT and MON in India.

TABLE X  
PRAGMATIC ANALYSIS OF VECM

Variables	Coefficient	Std. Error	t-stat	Variables	Coefficient	Std. Error	t-stat	Variables	Coefficient	Std. Error	t-stat	Variables	Coefficient	Std. Error	t-stat
BSE Shariah	-0.0027	-0.0741	-0.0364	Nifty Shariah	-0.139	-0.2023	-0.6872	CNX Shariah	-0.033	-0.3983	0.083	Shariah 25	-0.1413	-0.181	-0.7806
CPI	0.0252	-0.0175	1.4448	CPI	0.1163	-0.0429	2.7117	CPI	0.0759	-0.0468	1.6224	CPI	0.1017	-0.0385	2.6455
INT	0.2675	-0.146	1.8328	INT	0.5851	-0.3947	1.4823	INT	0.365	-0.3924	0.9302	INT	0.5272	-0.3477	1.5161
MON	-0.0644	-0.0135	-4.7687	MON	-0.131	-0.0412	-3.1793	MON	-0.1645	-0.0379	-4.3428	MON	-0.1201	-0.0362	-3.3165
ER	0.0638	-0.0416	1.5341	ER	0.0989	-0.1231	0.8029	ER	-0.0601	-0.1239	-0.4852	ER	0.124	-0.1104	1.1233
R-squared	0.647745			R-squared	0.66178			R-squared	0.732796			R-squared	0.653142		
F-statistic	3.852837			F-statistic	4.099661			F-statistic	5.746116			F-statistic	3.94539		
Prob (F-statistic)	0.000081			Prob (F-statistic)	0.00004			Prob (F-statistic)	0.000001			Prob (F-statistic)	0.000062		

The results of VECM reflect that coefficient should be negative. It depicts that error correction rate of BSE Shariah index is -0.0027 at 0.05 levels of significance, which is followed by MON (-0.0644). Error correction rate of CPI, INT and ER are arisen (0.0252, 0.2675 & 0.0638 respectively) positively. R-square value is 64.77%, it shows that VECM model is best fitted. F-statistic probability is less than 5% i.e. 0.000081, which shows that the F-statistic is significant. Nifty Shariah coefficient (-0.1390) is negative. R-square is 66.17% meaning that the model is best fitted. CNX Shariah has negative coefficient, which is (-0.0330), R-square is also 73.27%. F-statistics is less than 5% (0.000001) meaning that the model is best fitted. Shariah 25 shows the negative coefficient, which is (-0.1413) and R-square is 65.31%. F-statistics is also less than 5% (0.000062) meaning that VECM is best fitted model for all Islamic Stock Market Indices.

TABLE XI  
PAIRED GRANGER CAUSALITY TEST

Null Hypothesis:	Obs	F-Statistic	Prob.	Null Hypothesis:	Obs	F-Statistic	Prob.
Nifty Shariah does not Granger Cause BSE Shariah	72	1.1456	0.3476	INT does not Granger Cause CNX Shariah	72	0.3688	0.8678
<b>BSE Shariah does not Granger Cause Nifty Shariah</b>		<b>13.1139</b>	<b>0.0000</b>	CNX Shariah does not Granger Cause INT		1.0663	0.3890
CNX Shariah does not Granger Cause BSE Shariah	72	0.8940	0.4916	EX does not Granger Cause CNX Shariah	72	0.7394	0.5972
BSE Shariah does not Granger Cause CNX Shariah		1.4157	0.2331	<b>CNX Shariah does not Granger Cause EX</b>		<b>2.7030</b>	<b>0.0296</b>
Shariah25 does not Granger Cause BSE Shariah	72	1.5825	0.1803	CPI does not Granger Cause Shariah25	72	0.7027	0.6238
<b>BSE Shariah does not Granger Cause Shariah25</b>		<b>14.0729</b>	<b>0.0000</b>	Shariah25 does not Granger Cause CPI		0.2731	0.9259
CPI does not Granger Cause BSE Shariah	72	1.2852	0.2836	MON does not Granger Cause Shariah25	72	1.4254	0.2297
BSE Shariah does not Granger Cause CPI		0.7838	0.5658	Shariah25 does not Granger Cause MON		1.1687	0.3363
M3 does not Granger Cause BSE Shariah	72	0.2822	0.9209	INT does not Granger Cause Shariah25	72	1.2693	0.2903
BSE Shariah does not Granger Cause M3		2.0186	0.0903	Shariah25 does not Granger Cause INT		1.3314	0.2647
INT does not Granger Cause BSE Shariah	72	0.9222	0.4737	EX does not Granger Cause Shariah25	72	1.1220	0.3596
BSE Shariah does not Granger Cause INT		1.5896	0.1784	Shariah25 does not Granger Cause ER		1.63414	0.1664
EX does not Granger Cause BSE Shariah	72	1.3597	0.2537	MON does not Granger Cause CPI	72	1.6202	0.1700
BSE Shariah does not Granger Cause EX		1.1998	0.3215	CPI does not Granger Cause MON		1.0719	0.3860
CNX Shariah does not Granger Cause Nifty Shariah	72	1.0103	0.4205	<b>INT does not Granger Cause CPI</b>	<b>72</b>	<b>3.7030</b>	<b>0.0058</b>
Nifty Shariah does not Granger Cause CNX Shariah		3.1695	0.0138	CPI does not Granger Cause INT		1.6151	0.1714
Shariah25 does not Granger Cause Nifty Shariah	72	0.4388	0.8195	ER does not Granger Cause CPI	72	0.2498	0.9382
Nifty Shariah does not Granger Cause Shariah25		0.4416	0.8175	CPI does not Granger Cause ER		1.7070	0.1484
CPI does not Granger Cause Nifty Shariah	72	0.6999	0.6259	<b>INT does not Granger Cause MON</b>	<b>72</b>	<b>2.9429</b>	<b>0.0200</b>
Nifty Shariah does not Granger Cause CPI		0.2412	0.9424	<b>MON does not Granger Cause INT</b>		<b>2.2992</b>	<b>0.0573</b>
M3 does not Granger Cause Nifty Shariah	72	1.5110	0.2014	ER does not Granger Cause MON	72	0.9137	0.4791
Nifty Shariah does not Granger Cause M3		0.84986	0.5206	MON does not Granger Cause EX		1.0230	0.4132
INT does not Granger Cause Nifty Shariah	72	1.2687	0.2906	ER does not Granger Cause INT	72	0.8486	0.5214
Nifty Shariah does not Granger Cause INT		1.2495	0.2989	INT does not Granger Cause ER		0.3682	0.8682
EX does not Granger Cause Nifty Shariah	72	1.5486	0.1901				
Nifty Shariah does not Granger Cause EX		1.9146	0.1067				
<b>Shariah25 does not Granger Cause CNX Shariah</b>	<b>72</b>	<b>2.4311</b>	<b>0.0462</b>				
CNX Shariah does not Granger Cause Shariah25		0.6154	0.6885				
CPI does not Granger Cause CNX Shariah	72	0.4057	0.8428				
CNX Shariah does not Granger Cause CPI		0.1935	0.9638				
M3 does not Granger Cause CNX Shariah	72	0.7688	0.5763				
CNX Shariah does not Granger Cause M3		1.0460	0.4002				

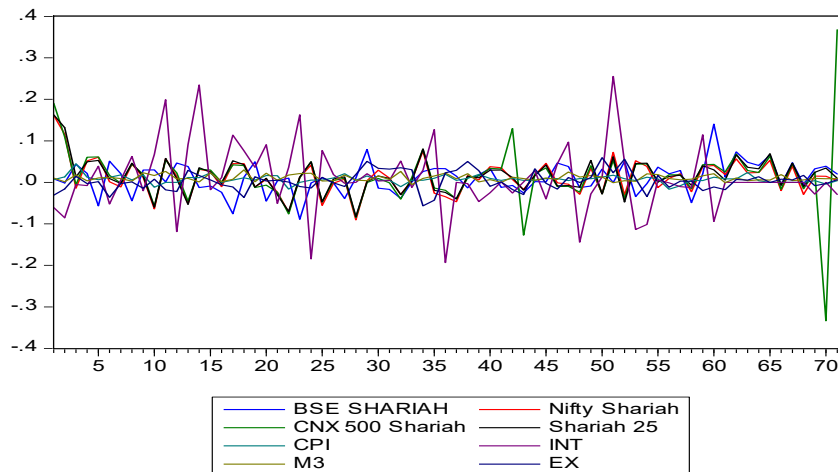


Fig. 1 Graphical Presentation of Islamic Stock Market Indices and Macroeconomic Variables

## V. CONCLUSION

The focus of this paper was to investigate the dynamic linkage between Indian Islamic stock market indices and macroeconomic variables including CPI, MON, INT and ER. This study analysed the long run relationship between Islamic stock indices and macroeconomic variables using data from April 2009 to March 2015. ADF and PP test allowed checking the data stationary. The investigator checked stationarity in the time series data on the basis of level and first difference. There are two co-integration relationships between S&P BSE 500 Shariah Index and economic variables. Nifty Shariah and CNX Shariah index have four co-integrated equations with macroeconomic variables. Shariah 25 has also co-integration with macro-variables. It means that Indian Islamic stock market has long run relationship with macroeconomic variables. The result of Granger causality test shows that there is unidirectional relationship between BSE Shariah and Nifty Shariah, BSE Shariah and Shariah 25, Shariah 25 and CNX Shariah, CNX Shariah and ER, INT and CPI. This reveals that BSE Shariah index affects the Nifty Shariah and Shariah 25. It is also seen that BSE Shariah index can be used as leading indicator for change in ER and INT. The bi-directional relationship exists between INT and MON. It is also followed in between BSE Shariah, Nifty Shariah, CNX Shariah and Shariah 25. The present study is limited to only four selected macroeconomic variables. Inclusion of more variables with a longer time period may improve the results. A logical extension of the study can be done by including more variables and different types of Islamic stock indices. India is secular country, where several religious communities' people are live together. They all are having different mindset and different believes of investment. Shariah law gives the ethical investment direction which is not only followed by Muslim investors but also for the Non-Muslim investors as well. Islamic finance is contributing to the growth of worldwide economy. Islamic finance will be the potential future of world economy because Islamic capital market works with financial ethics and social justice. Opportunities

are unlocking in Islamic microfinance, Islamic insurance, Islamic bond market and Islamic banking in India.

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