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Islamic equity market and macroeconomic variables: evidence from the UK

Mohammad Asad¹ and Mansur Masih²

Abstract

The recent turbulent environment in the UK has given rise to Islamic finance as an alternative diversification investment class. Linked to this fact we tend to investigate the relationship of UK Islamic stock market with the given set of macroeconomic variables. Quarterly data are obtained for GDP, Dow Jones Islamic UK (DJIUK), Exchange rate, Interest rate and CPI. Due to the lack of empirically proven Islamic market theories, time series techniques have been applied to gauge the long run relation and causality between the variables. Using Johansen and ARDL tests we confirm the cointegration between the variables. Interest rate is the weakest variable due to the equity capital structure of Islamic stock and sector weightage of Dow Jones Islamic UK. GDP is found to be the leader, as equity markets respond to GDP movement more than conventional bond market and given the fact that Islamic stocks are based on equity relationship, policymakers should always strive to maintain a stable GDP. This research hopes to contribute to the existing framework of Islamic financial stock market used by asset managers and policy makers.

Keywords: Islamic equity, macroeconomic variables, UK

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1- Introduction: Motivation of the research

With the advent of recent financial shocks, stock market characteristics have changed their movement and are now more towards unpredictable pattern. These unpredictable movements have induced a shift from a normal macroeconomic relation pattern. Significant amount of literature have been written to explain the relation and causal effect of stock market to various macroeconomic variable. Generally stock prices are believed to be affected by some fundamental macroeconomic variables such as interest rate, exchange rate, inflation rate, money supply and GDP as well.

According to the arbitrage pricing theory formulated by Roll and Ross (1980) and Fama (1981), the relation between stock market and macroeconomic variables does exist. Stock markets movements play a dominant role in portfolio construction and equity investment decision. And as we are aware quiet recently investors have started pulling out money from the equity market and diverting it towards the treasury or the bond market. This is due to the presence of persistent volatility in the stock market combined with inability of portfolio managers to predict the stock market trend and optimize the sharp ratio. This can be partly blamed to the stock market and partially to the financial institutions not applying latest tools to gauge the direction of the market.

Post financial crisis have also bought Islamic financial market to serve as an alternative to the current conventional market. Macroeconomic variables also affect the Islamic stock market as they do to the conventional. But it is interesting to look at the causality of macroeconomic variables in relation to the Islamic stock market. Islamic stock market may show a different pattern due to the fact that they are less leveraged and are involved in investments only related to real economic activity. Keeping this in mind the effect of interest rate could play a different role when it comes to Islamic stock market due to the difference in nature of capital structure. Effect of GDP might also differ when compared to conventional as the nature of dominant industries in Islamic stocks markets differ.

2- Main objectives of the study:

Having explained above the possibility of different characteristics in the causality of Islamic stock market and macroeconomic variables, in this paper we attempt to shed some light on the same. Islamic stocks pass through rigorous criteria prior to their listing in the stock market. The screening criteria significantly changes the way in which the market responds to the movement of macroeconomic variables as compared to conventional due to the difference in sector weightage.

We will use empirical evidence and existing theories to determine the most relevant macroeconomic variables for the Islamic stock market. Similar to the other stock markets the Islamic markets are also susceptible to the volatility in the financial system, but due to the nature of operation market might behave in a different pattern.

Since the Islamic finance industry is in organic face, not much of researches have studied the relationship between the macroeconomics variables and the Islamic stock markets.

With the development of time series over regression, it is now possible for us to test the long term relationship and theoretical significance of our variables followed by direction of causality. Time Series is very relevant to Islamic finance market as not much of empirical backed theory exists to support the theories in Islamic finance. If regression was to be used, it would have posed serious limitation in terms to assumption used to determine dependent and independent variables. Due to lack of extensive financial models for Islamic financial frame, time series would perfectly fit in the research as we would be testing the significance of the variable selected based on intuition and strong judgement.

Researches done in this area have been more focused towards Asia pacific region rather than the European region. With the best of our knowledge there haven't been any research relating to the effect to UK macroeconomic variables and UK Islamic stock market. For our research we intend to test the effect of macroeconomic variables on Dow Jones Islamic UK. With continuous downgrading of sovereign debt in the Europe market and un-employment rise we expect our results to be slightly different from the established theories. Core objectives are briefed as follows:

- Study the relationship between macroeconomic variables and Islamic stock markets.
- Determine the direction of causality.
- Policy implication of derived results.
- Perform system wide shock and observe horizons to equilibrium
-

3- **Literature Review:**

Over the past few years abundant researches have depicted positive as well as negative relation of the stock market with the macroeconomic variables. Chen Roll and Ross (1986) selected set of macroeconomic variables based their intuition to determine US stock market return. They concluded by showing strong relationship between predicted stock market returns and macroeconomic variables. Fama (1991) empirical research suggested that share price and expected inflation are negatively related. On the other hand Lee (1992) suggests that share returns signals changes in expected inflation due to the relationship between real economic activity and money supply. Long and short term interest rates are negatively related to the stock market (French et al- 1987), this could be due to the fact that short term interest rates are sensitive to changes in economic policies of a country.

However few researches focused on United Kingdom showed that not all macroeconomic variables affect the UK stock market. Similar to Chen Roll & Ross (1986), Poon and Taylor (1991) found that macroeconomic variable do not impact the stock market in UK, they used ARIMA model to test their data. Other findings by Diacogiannis (1986), Cheng (1995) also suggested that APT model by Chen Roll and Ross cannot be used to predict the UK stock market. Most of the researches conducted on

UK market depict that macroeconomic variables based on APT model by Chen Roll & Ross does not show significant effect on the UK financial market. On the other hand researches by Priestley (1996), Clare & Thomas (1994) suggested that APT factors are significant when determining the relationship.

Islamic stock market unlike the conventional are not blessed with extensive empirical researches supporting their functioning and predictions. In 2005 Hakim and Rashidian researched on risk return profile of Dow Jones Islamic compared to its conventional counterpart. Their findings suggested that there exist different risk return characteristic of Islamic stocks when compared to conventional. A study by M.Shabri Abd. Majid and Rosylin Mohd.Yusof found that real effect exchange rate, money supply M3, Treasury bill, and Federal Reserve rate have significant effect on Islamic stock prices. `

One of the core limitations of the studies done in the past was the methodologies used to estimate the model. In our research we attempt to provide improved results by showing theoretical relations and causality between the variables using time series.

4- Theoretical Framework:

Corpus of our research is to study the macroeconomic variables relationship with respect to Dow Jones Islamic market in the United Kingdom. It has been established through various studies that bond between macroeconomic variable and stock market could be negative or positive. With respect to the UK stock market as discussed in literature review, few researches suggest that macroeconomic variables do not strongly derive the UK stock market as opposed to other which suggests that macroeconomic variables pose a relationship with the UK stock market. We extract the relevant macroeconomic variables based on the established theories/ empirical researches and insert them to our Islamic stock market research to study the effect.

Following variables have been selected for the research:

Quarterly data have been obtained from data stream for the following variables:

- 1- **GDP:** In 1981 FAMA found that GDP is one for main factor in determining the fluctuation the corporate cash flow and thus stock market returns. Causal relation of GDP and stock market prices depicts that they move together.
- 2- **Exchange rate:** UK economy in the past years had a shift in their production pattern. According to surveys UK is the 7th largest importer in the world. This is due to recent merges and acquisitions of UK industries with India and China. 73% of their GDP is dependent on the service sector. Other than medicine, food and pharmaceutical they reply mostly on imports.

When the UK domestic currency depreciates against the foreign currency, import prices will increase and export prices will decrease. This will cause imports price to rise and effect the stock market as well. And since real economic production sector dominates the Islamic stock market in terms of weightage, rising export prices would hurt the market.

- 3- **Interest rate** might not necessarily have direct impact on the Islamic stock market. The shocks coming in will be from the country economics such as inflation etc. The reason being that Islamic stocks are not allowed to take on leverage to adjust their capital structure for tax benefits. When there is no interest component then there is no liability towards the bondholders. If the demand for companies good is stable and it continues to cut back its expenses that's mostly due to debt expenses. We will discuss on the importance of this very variable in the further sections.
- 4- **CPI (as a proxy for inflation rate):** Inflation directly affects stock market due to rising or falling prices of good within the economy. Monetary policies applied by the government effects consumer followed by stock prices. High inflation combined with higher interest rate creates stiff market conditions.
- 5- **Dow Jones Islamic Stock Market UK:** First Dow Jones Islamic Market Index was launched in Bahrain back in 1999. All the stocks included in the index pass through rigorous Sharia Screening. Qualitative as well quantitative measures are taken into consideration before a stock passes into the index.

Qualitative Screens:

- i. Alcohol
- ii. Pork-Related products
- iii. Conventional financial services
- iv. Entertainment
- v. Tobacco
- vi. Weapons and defence

Financial Ratio Screens:

- i. Total debt/ 24-months average market cap
- ii. Sum of companies' cash and interest-bearing securities/24-months average market cap.
- iii. Accts Receivables/24-months average market cap

As of September 2010 the Dow Jones conventional market held 21.35% share in financial market as compared to 0.33% of financial in Dow Jones Islamic. Dow Jones Islamic was mainly dominated by

Technology, Oil& Gas and the industrial sector. This vast spread of difference in market weightage can lead to a different chronological effect of macroeconomic variables on the Islamic stock market.

5- Methodology Used:

Empirical researches focusing on study of relationship between macroeconomic variables and stock market usually adopt Regression or Time series technique. Regression for many years till now assumed that variables mean, variance are constant and they are non-stationary. Whereas in the real world these assumption do not hold true, macroeconomic variables are proven to be non-stationary (Hill et. al., 2001), (Taha & Loganathan 2008). In order to correct this issue we apply modern time series technique which overcomes these issues and also solves to autocorrelation and heteroscedasticity as well.

Second major drawback of Regression is the assumption of dependent and independent variable which is based on pure theory and intuition. However there exist several theories supporting and rejecting a particular argument. It would not be feasible to assume a variable as dependent and independent. We must let the data decide which variables depends and leads. Especially in Islamic finance where theories aren't tested as exhaustively as in conventional we must let the data decide on the relationship.

Furthermore, Long run structural modelling (LRSM) in time series allows us to theoretically estimate the long-run relations by imposing exact and over identification. With time series there exist a possibility to determine the direction of causality between the variables, which will help us to draw conclusion relating to policy implications.

In effect of limitation laid down by regression; time series was a contribution by R. Engle and C. Granger (1987), which is now widely applied.

To start off first we conduct unit root test to determine non stationary of the variable, if the variables are found to be in differenced form the long term trend element is removed which is contradictory to time series as we are testing long run relationship. Regression had this huge limitation when working with non-stationary variables as they were spurious, in order overcome this issue they were differenced which in turn removed the long term information. Later we go about testing cointegration to determine the relation between stock market and macroeconomic variables. A limitation of estimated cointegration vector is that, they are not concerned with theory. LRSM takes care of this limitation by imposing exact and over identification restrictions which are based on theories and of economics and finance under review.

6- Data & Empirical Results:

Data used for our research is expressed in quarterly format. Due to GDP data being published only quarterly all our variables are extracted in quarterly format from DataStream.

Five variables were selected for our research namely: GDP, Interest rate (INTRATE), Exchange rate (EXCHRATE), Consumer price index (CPI), Dow Jones Islamic UK(DJIUK).All level form variables are transformed into LOG form expect for interest rate and CPI as they were originally expressed in percentage

LEVEL FORM			
Variable	Test Statistics	Critical Value	Implication
LDJIUK	-2.3956	-3.4849	Non-Stationary
LEXCRATE	-2.2697	-3.4849	Non-Stationary
LCPI	-2.3877	-3.4849	Non-Stationary
LINTRATE	-1.4949	-2.9101	Non-Stationary
LGDP	-.99445	-3.4849	Non-Stationary

form. Since the data for Dow jones is dated back to 1996 and is expressed in quarterly format, readers should bear in mind the short series of the sample

Unit Root Test

It is important to determine the stationarity of the variable before we proceed towards cointegration test. In our study we use ADF and PP test. ADF take care of autocorrelation and PP in addition to autocorrelation takes care of heteroscedasticity. Table 1a summaries the outcome of ADF tests in level form and table 1b summaries PP for level form.

ADF-Table 1a

PP-Table 1b.

Dependent Variable	LEVEL FORM		
	Regressor	T- RATIO	Implication
DLCPI	LCPI (-1)	1.9144	Non-Stationary
DLDCIUK	LDJIUK (-1)	2.3600	Stationary
DLGDP	LGDP (-1)	1.7456	Non-Stationary
DLEXCRATE	LEXCRATE (-1)	2.0158	Non-Stationary
DLINTRATE	LINTRATE (-1)	.0089212	Non-Stationary

The null hypothesis is that variable has a unit root. Level form ADF and PP cannot reject the null. Below we difference the variables, table 2a represents ADF in differenced form and table 2b represents PP in differenced form.

ADF-Table 2a

DIFFERENCED FORM			
Variable	Test Statistics	Critical Value	Implication
DDJIUK	-4.9313	-2.9109	Stationary
DEXCRATE	-6.3188	-2.9109	Stationary
DCPI	-6.7118	-3.4862	Stationary
DINTRATE	-3.4730	-2.9109	Stationary
DGDP	-3.0163	-2.9109	Stationary

PP-Table 2b

Differenced FORM			
Dependent Variable	Regressor	T- RATIO	Implication
D2DCPI	DLDCPI (-1)	7.4975	Stationary
D2DDJIUK	DLDDJIUK (-1)	7.3529	Stationary
D2DGDP	DLGDGP (-1)	8.1688	Stationary
D2EXCRATE	DLEXCRATE (-1)	6.9035	Stationary
D2INTRATE	DLINTRATE (-1)	3.4582	Stationary

After performing first difference, both ADF and PP tests reject the null hypothesis. Now that the data is stationary by applying ADF and PP in first difference we don't test further and proceed with the results.

The lag length of time series analysis is determined by selecting lag length given by Schwarz information criteria (SBC) and Akaike information Criteria (AIC). We write the variable in the log differenced form in order to conduct the test. Following are the results:

Table 3

```

Test Statistics and Choice Criteria for Selecting the Order of the VAR Model
*****
Order    LL        AIC        SBC          LR test          Adjusted LR test
   3    467.6757    387.6757    302.5903          -----          -----
   2    435.0645    380.0645    321.5683    CHSQ( 25)= 65.2225[.000]    48.3909[.003]
   1    394.1233    364.1233    332.2163    CHSQ( 50)= 147.1048[.000]    109.1423[.000]
   0    355.9711    350.9711    345.6533    CHSQ( 75)= 223.4091[.000]    165.7552[.000]
*****
AIC=Akaike Information Criterion    SBC=Schwarz Bayesian Criterion
    
```

Based on the above results we find that optimum order of VAR to be 3 in case of AIC and 0 based on SBC. We proceed with VAR 3 based on AIC.

Cointegration test:

To investigate the long run relation between stock market and macroeconomic variable we use Engle Granger, test, ARDL and Johansen test. The Engle-Granger test is able to test only for one cointegration. It displays only one residual which corresponds to the result that whether there exists cointegration or not. Whereas in Johansen test, it assigns coefficients to every variable and displays the set of variables which made the error term stationary. With Johansen test we can test more than one cointegration. Below is a tabular representation of Engle- Granger test.

Table 4:

<u>Engle and Granger Test</u>				
Based on OLS regression of LDJIUK on:				
CONS	LEXCRATE	LCPI	LINTRATE	LGDP
Test Statistic AIC Value)	-1.9177 (Highest		Critical Value	-4.6517

We perform regression on all non-stationary variables and test the error term for the regression. If the error term is found to be stationary all the variables are said to have been cointegrated. We run OLS and regress LDJIUK as our dependent variable and perform ADF test on the error term. As we look at the table above we find that the absolute critical value is 4.6517 which is higher than our test statistic. This proves that variables are not cointegrated.

Table 5: Johansen test

<u>Johansen COINTEGRATION TEST:</u>					
<u>MAXIMUM EIGEN VALUE STATISTICS</u>					

Null	Alternative	Statistic	95% Critical Value	90%Critical Value	
r = 0	r = 1	37.8684	37.8600	35.0400	
r<= 1	r = 2	27.5385	31.7900	29.1300	
<u>TRACE STATISTICS</u>					
Null	Alternative	Statistic	95% Critical Value	90%Critical Value	
r = 0	r>= 1	94.2409	87.1700	82.8800	
r<= 1	r>= 2	56.3725	63.0000	59.1600	

For the above results the null is that “there is no cointegration”. For Eigen value test statistics of 37.8684 is higher than 95% and 90% bound which allows rejecting the null. Further on $r \leq 1$ indicates that number of cointegration vectors are less than or equal to 1, and since our statistics of 27.5385 is lower than both 95 and 90% we accept that there is 1 cointegrating vector. For trace statistics also we accept that there is cointegration as we can reject the null of no cointegration at 90 & 95% bound. For the null $r \leq 1$, test statistic is lower than 90 and 95% implying that there is one cointegrating vector. Finding cointegration suggests that there exists long run relationship between the variable and they are in equilibrium in the long run. Each variable contains information to predict other variables.

Table 6- ARDL Approach:

Joint test of zero restrictions on the coefficients of additional variables:

Lagrange Multiplier Statistic	CHSQ(5)=	11.4948[.042]
Likelihood Ratio Statistic	CHSQ(5)=	12.7366[.026]
F Statistic	F(5, 43)=	1.9969[.098]

ecm = LDJIUK -52.9497*LEXCRATE + .56872*LCPI -7.3475*LINTRATE -23.8754*LGDP + 271.5194*CONS

R-Squared	.59299	R-Bar-Squared	.46027
S.E. of Regression	.078386	F-stat.	F(13, 48) 5.1553[.000]
Mean of Dependent Variable	.0099501	S.D. of Dependent Variable	.10670
Residual Sum of Squares	.28264	Equation Log-likelihood	79.1383
Akaike Info. Criterion	63.1383	Schwarz Bayesian Criterion	46.1212
DW-statistic	2.0359		

Given F-Statistics of 5.1553 is higher than the F Critical (4.667) as calculated by Pesaran et al. 1996 .Using 95% confidence level based on an intercept and trend we reject the null of “ no long term level relationship between the variables”.

This result coincides with the Johansson cointegration test endorsing the robustness of cointegration.

Long run structural modelling (LRSM)

Having conducted the cointegration test we still not sure whether the cointegrating variables are in line with theoretical framework or not. We conduct this test by long run structural modelling (LRSM), this step answers the regression school of thought. LRSM tests whether the cointegration results are aligned with theory or not. LRSM also test the significance of variable by testing the coefficients of the variables. Regression school of thought says that we cannot rely only on mechanical numbers to judge whether there exist long term relationship between the variables or not. To overcome this hurdle time series now using LRSM as follows:

Table 7: Exact and Over Identification Restriction On The Cointegrating Vectors

PANEL-A (EXACT)		PANEL-B (OVER)	
LDJIUK	1.0000 (*NONE*)	LDJIUK	1.0000 (*NONE*)
LEXCRATE	-1.2482 (2.8618)	LEXCRATE	-.0000 (*NONE*)
LGDP	20.1202 (12.2639)	LGDP	24.3513 (10.4030)
CPI	.62844 (.33916)	CPI	.72667 (.32806)
INTRATE	-.69543 (.25014)	INTRATE	-.72357 (.28196)
Trend	-.31516 (.16404)	Trend	-.36667 (.15147)
Log-Likelihood	333.4194	Log-Likelihood	333.3399
Chi-Square	NONE	Chi-Square	.15906 [.690]

Since the focus of the study is test macroeconomic variable interaction with the stock market, in (Panel-A) we impose exact identification restriction of unity one on DJIUK. All variables except for exchange rate are found to be significant. We impose over identification restriction (Panel B) on exchange rate to see whether it is significant or not. According to the result we accept the null that the variable exchange is insignificant and proceed with Panel A. Since previous studies have already established that exchange rate is a core variable we will still include it in our research. Also due to the nature of Dow jones Islamic finance market sector weightage exchange rate plays a significant role. Ajayi and Mougoue (1996) researched relationship between stock prices and exchange rates of eight advanced economies among which UK was also present. They found that there exist significant relationship between stock market and exchange rate.

Vector Error Correction Model

Above test's deal with the study of theoretical long run relationship between the variables. But which variable is leading and lagging is not yet clear. Unlike regression we don't assume the lead and lagged variable instead we test it using VECM. In VECM the error correction term is derived from a linear of non-stationary variables that makes the error term to be stationary and cointegrated.

Table 8

Dependent Variable	DJIUK	EXCH RATE	GDP	INT RATE	CPI
dLDJIUK1	1.1523 [.255]	.54910 [.585]	.20755 [.836]	1.1396 [.260]	.026469 [.979]
dLEXCRATE1	.77111 [.444]	.56662 [.573]	.91805 [.363]	.24087 [.811]	2.2684 [.028]
dLGDP1	.40384 [.688]	.036758 [.971]	.96730 [.338]	3.6402 [.001]	1.1991 [.236]
dINTRATE1	2.4791 [.017]	4.2356 [.000]	2.1016 [.041]	5.2629 [.000]	1.5643 [.124]
dCPI1	1.1260 [.265]	1.3601 [.180]	.077031 [.939]	1.4633 [.150]	2.8502 [.006]
ecm1 (-1)	.32618 [.746]	1.0029 [.321]	.56713 [.573]	4.5589 [.000]	2.3949 [.020]
Implication	Exogenous	Exogenous	Exogenous	Endogenous	Endogenous
<u>DIAGNOSTIC TEST'S</u>					
CHI-SQ SC-1	3.1235 [.537]	1.4627 [.833]	28.3472 [.000]	8.5940 [.072]	14.3379 [.006]
CHI-SQ FF-1	.91325 [.339]	8.2948 [.004]	18.9392 [.000]	18.7491 [.000]	.61502 [.433]
CHI-SQ N-1	2.8780 [.237]	3.9192 [.141]	1.0342 [.596]	8.5187 [.014]	.90155 [.637]
CHI-SQ HET-1	.46862 [.494]	13.5988 [.000]	1.2065 [.272]	25.3702 [.000]	.26877 [.604]

Above results signify that DJIUK, EXCHRATE , GDP are exogenous followed by Int rate and CPI being endogenous. Usually interest in most of the studies is found to be among the exogenous. One limitation of VECM is that, it does not tell us which variable is more exogenous and endogenous. Looking at the above results it would be difficult for the policy makers to come up any implications.

The diagnostic test for serial correlation, functional form, normality and heteroscedasticity are normal in most expect for few. Due to time constraint corrective measures are not taken into consideration

Variance Decomposition (VDC)

We further move on Variance Decomposition (VDC) to determine the exogeneity among the variables. Variance decomposition is an error forecast of a particular variable in the VAR at different horizon. It fractures down the variables error forecast into proportions attributable to shocks of each variable in the system including its own. The variables which is explained most by its own past is regarded as the most exogenous variable and variable which least explains its own past is classified as the last in order of endogeneity. For our research we use Orthogonalized and generalised approach. In Orthogonalized approach when a variable is shocked all other variables are held constant, also Orthogonalized VDC are dependent on the ordering in the VDC. Whereas in generalised VDC the result is independent of the ordering in the VAR. In generalised VDC

when a variable is shocked all other variables are allowed to freely move and there is no constant holding which represents more realistic situation. In table 8a depicts Orthogonalized approach and table 8b shows generalised approach. Results in 10 and 20 years horizon are studied.

Table 8a. Orthogonalized Forecast Error Variance Decomposition

Forecast Period- 10					
VARIABLES	DJIUK	EXCRATE	GDP	INTRATE	CPI
DJIUK	72.812	0.55044	15.021	4.8279	6.788
EXCRATE	6.551	66.156	20.706	4.248	2.339
GDP	4.1758	3.4927	88.911	1.4962	1.9244
INTRATE	19.835	10.013	50.164	14.013	5.9741
CPI	3.4838	15.06	2.8398	22.991	55.625

Forecast Period- 20					
VARIABLES	DJIUK	EXCRATE	GDP	INTRATE	CPI
DJIUK	73.912	0.33851	14.695	4.8171	6.2374
EXCRATE	6.1957	68.422	20.529	3.4596	1.3935
GDP	4.0884	3.2581	90.347	0.84419	1.4627
INTRATE	20.74	10.603	52.166	10.513	5.9783
CPI	3.8717	15.089	2.5778	25.456	53.005

Results from the above test shows that both 10 and 20 period horizon following variables are ranked according the degree of explanation from their own past:

- 1) GDP 2) DJIUK 3) EXCRATE 4) CPI 5) INTRATE

Before drawing any conclusion from the results we also analyse the results obtained by Generalised VDC forecast in **table b** as follows.

Table 8b.: Generalized Forecast Error Variance Decomposition

Forecast Period- 10					
VARIABLES	DJIUK	EXCRATE	GDP	INTRATE	CPI
DJIUK	68.27	4.06	16.65	1.53	9.5
EXCRATE	5.652	62.095	22.355	8.058	1.84
GDP	3.809	4.521	83.729	6.599	1.342
INTRATE	14.699	12.134	41.05	23.62	8.5
CPI	2.609	12.772	1.51	23.666	59.443

Forecast Period- 20					
VARIABLES	DJIUK	EXCRATE	GDP	INTRATE	CPI
DJIUK	69.601	3.569	16.555	1.015	9.26
EXCRATE	5.376	64.447	22.611	6.45	1.116
GDP	3.725	4.338	85.26	5.697	0.98
INTRATE	15.18	12.801	42.321	21.257	8.441
CPI	2.828	12.775	1.257	25.47	57.67

**) Result obtained were converted to unity and multiplied by 100 taking arithmetic means.*

Results from the above test shows that both 10 and 20 period horizon following variables are ranked according the degree of explanation from their own past and are when compared to Orthogonalized.

2) GDP 2) DJIUK 3) EXCRATE 4) CPI 5) INTRATE

Results tend to show that GDP is the most exogenous of all and Interest rate is the most endogenous.

GDP is one of the most important macroeconomic indicators a nations health. Investors view GDP very carefully in order to gauge where the economy is moving. It represents the total value of goods and services produced in the nation. Equity markets respond to GDP more spontaneously then the bond market. Stock market investors and portfolio managers use GDP reports to look at the corporate profits level and predict the future performance. High economic growth generates reflects higher stock prices which are induced by rising corporate profits. If the GDP contracts, consumers are reluctant to spend more and reduce their sending which will negatively affect the company's performance.

As explained earlier Islamic stock weightage in the Dow Jones Islamic market is more inclined towards manufacturing, health, IT and real estate, financial forms a very small portion. Decline is GDP in this case will directly affect the stock market.

Interest rate results may look counterintuitive in this study, by ranking last in the league table. Stocks of companies listed in the Islamic stock market have a very different characteristic as opposed to conventional. Below we further analyse the reason by interest rate endogeneity.

Capital structure induced effect of interest rate in conventional vs Islamic stock markets:

In conventional system corporates take on debt into their capital structure to seek tax advantage, a balance between debt and equity is struck to optimise profits by seeking maximum tax advantage. This is because interest is deducted before the taxable profits are arrived, so by establishing an optimum debt to equity ratio companies minus their interest before arriving at the taxable profits in order to reap maximum benefits. This theory was proposed by Modigliani and Miller in the year 1963.

Important point to note is that when companies take on more debt their bankruptcy and distress cost increases, thereby reducing this tax advantage. If we link this to stock market and crisis, we can say that

as the markets starts to fall the firms which carry more debt and having variable accounts payable interest rate could have a dampening effect.

Islamic stock market corporate capital structures are based on profit and loss sharing and are purely equity in nature. Interest does not play a role in the capital structure of the firm, however if the firm has financing from Islamic banks which are based on variable rate than there might be some effect as Islamic rates are benchmarked to interest rates. Despite the financing cost; the capital structure itself will remain somewhat stable as compared to conventional counterparts.

A very important additional point to note is that data available to us from Bloomberg (2010) shows that much of Islamic stocks in the Dow Jones comprises of IT and pharmaceutical. And these very sectors aren't much affected by the interest rates and more by the exchange rates.

*) Above reasoning are strictly based on our intuition and do not relate to any research.

Impulse Response Function (IRF):

Information presented in the VDC can be presented in a graphical form as well by applying impulse response function. IRF depicts the dynamic response route of a variable on other variables.

Chart 1a below shows the impulse response of GDP based on Orthogonalized approach and Chart 1b depicts the shock relating to GDP based on generalised approach.

Chart1a:

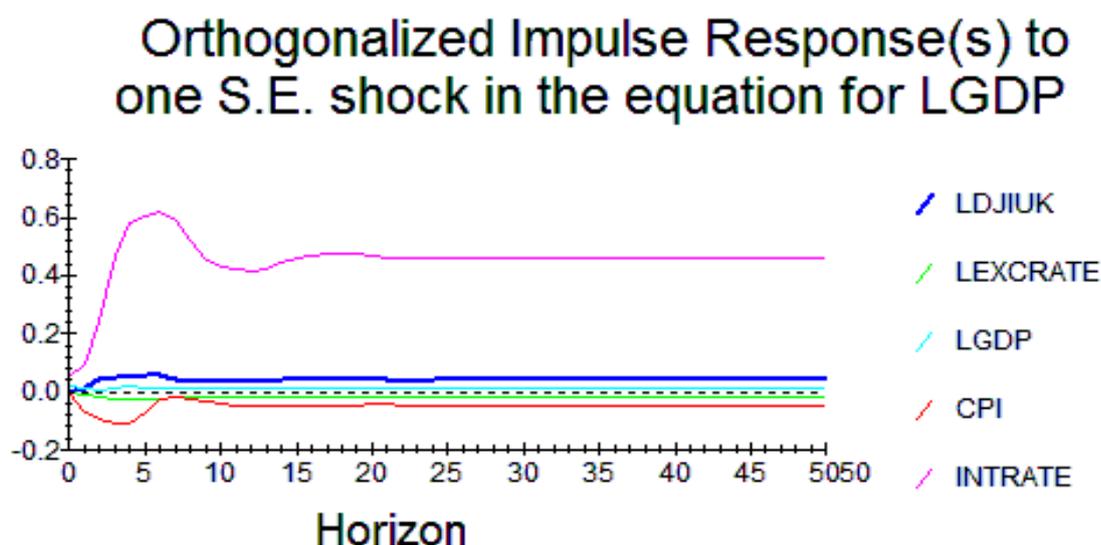
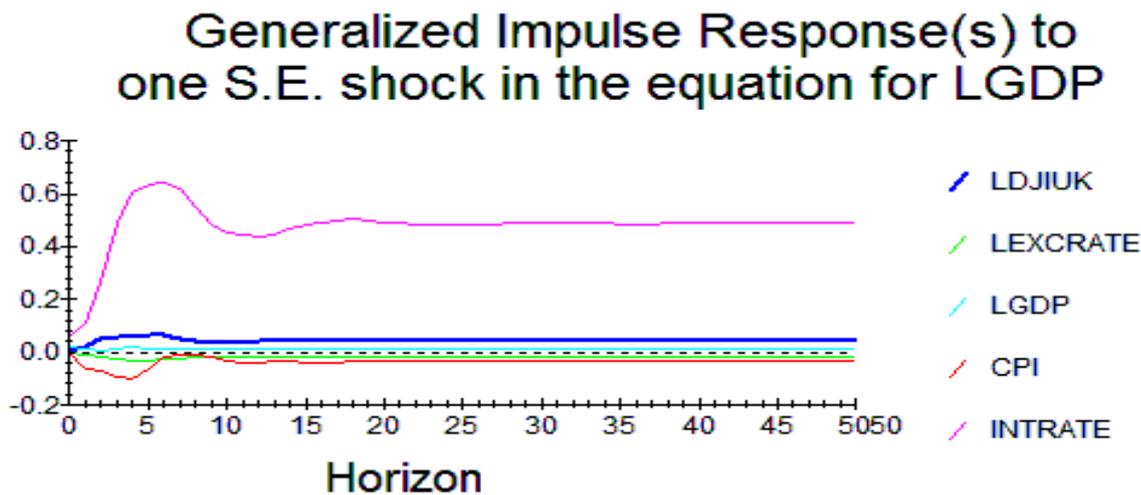


Chart 2b



Both Orthogonalized and generalized results are in line with the VDC results. GDP being our most exogenous is shocked and since interest rate variable is the most endogenous, it is deviates more than other variables.

Chart 2a and 2b below will show the effect on variables when interest rate is shocked:

Chart 2a- Based on Orthogonalized approach:

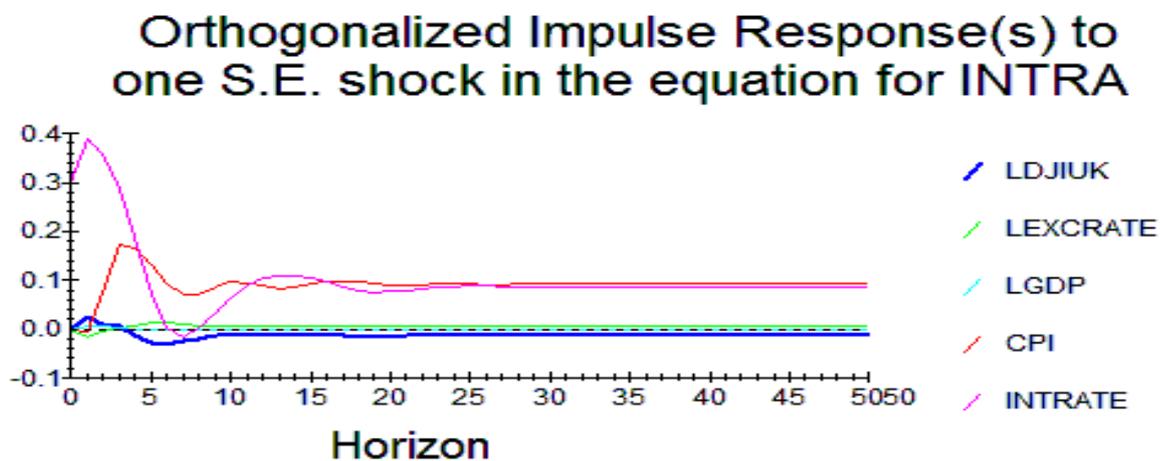
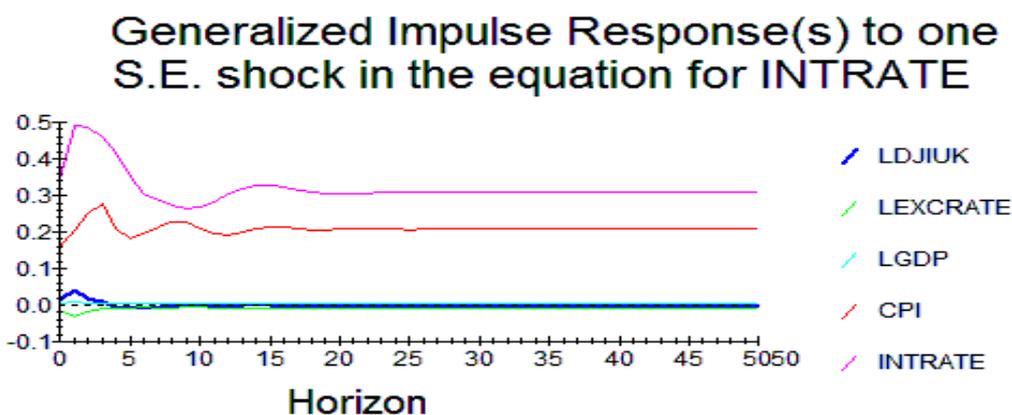


Chart 2b- Based on Generalised approach:



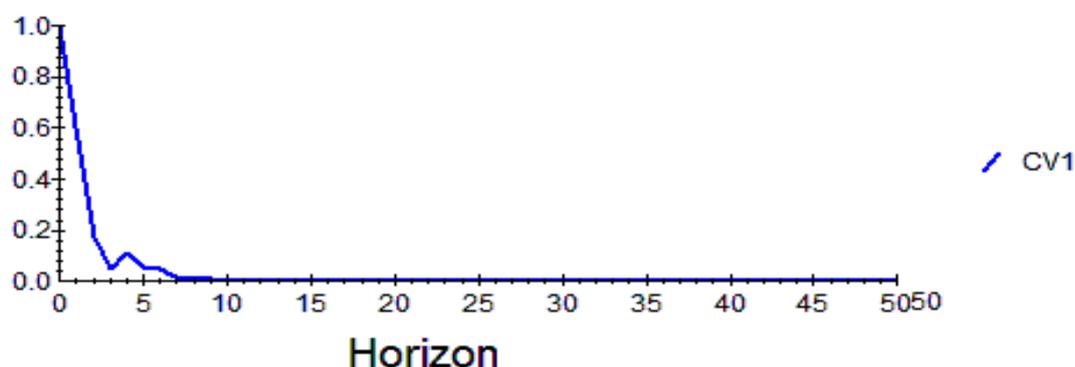
When our most endogenous variables interest rate is shocked, we can gauge the effect on other variables. GDP being our most exogenous variable is least effected by the shocks and above achieved results are perfectly in line with the VDC results

Persistence Profile:

In persistence profile we shock the complete cointegrating relationship of the variables and anticipate the time horizon required by the variables to get back to normal. Persistence profile reflects the system wide shock to the variable on the long run relationship; on the other hand IRF signifies the variable specific shocks on the variables. The shocks resulting are from the external factors to the cointegrating relation.

Chart 3 below shows the persistence profile shock:

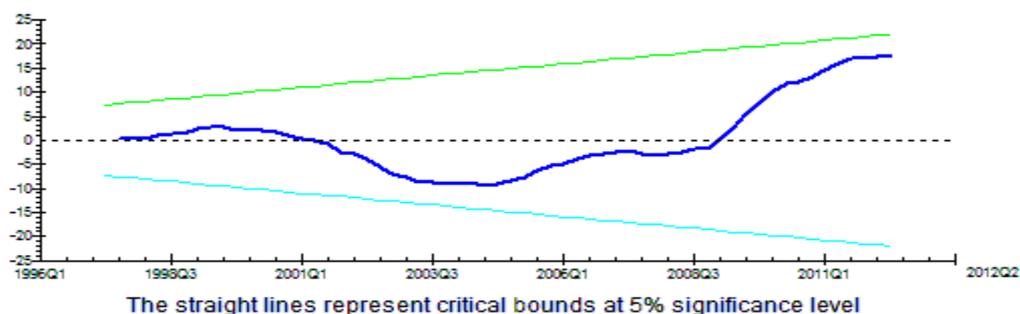
Persistence Profile of the effect of a system-wide shock to CV'(s)



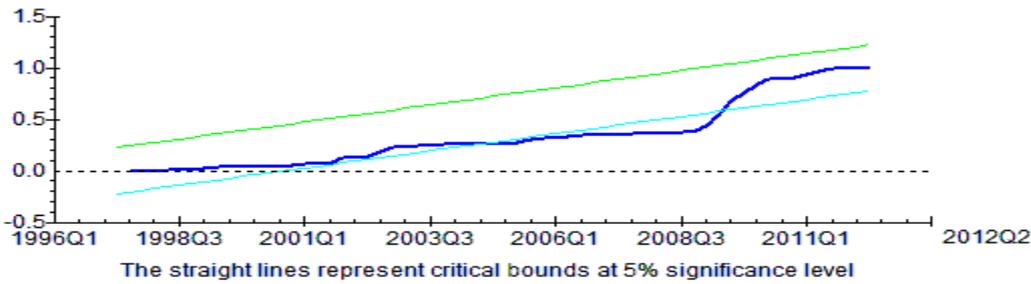
When external shock is imposed on the variables they temporarily deviate away from the equilibrium, reflecting that each variable will move differently in the short-run and are also not cointegrated temporarily. However all the variables will require 10 periods to revert back to cointegrating state and achieve long-run equilibrium.

CUSUM AND CUSUM Square test:

Plot of Cumulative Sum of Recursive Residuals



Plot of Cumulative Sum of Squares of Recursive Residuals



CUSUM tests shows where the structural change has occurred (when the sum of recursive residuals goes outside a critical bound). From the above result we can see that in Cusum of Squares Recursive Residual there is a structural break starting from mind 2006. This implies that we must break the series and conduct the test separately, but due to constraint we continue with the results.

7- Conclusions

This study examines the interaction of UK stock markets with selected macroeconomic variables. The time series data employed in this research comprises of quarterly observation of Dow Jones Islamic Market UK, nominal gross domestic product (GDP), Exchange rate (Exch rate), Interest Rate (Int rate) and Inflation rate (CPI).

In order to ensure non-stationarity of the variables, we applied ADF and PP test followed by 3 lag length of time series selected based on AIC. In order to ensure the robustness of long-run relationship we carefully employed Johansen test, ARDL test. We found our variables to be cointegrated using Johansen and ARDL. After establishing the long run, we test results through LRSM to ensure its alignment with the theory. All our variables excepting the exchange were found to be significant, to confirm we ran over identification test imposing restriction on exchange in which our chi-square was accepted. Despite the result we included the variable as it was significant based on the sector component weightage of the stock index which was mostly affected by exchange rate. In order to determine variables dependent and independent variable we move to VECM and find that GDP, DJIUK, Exchange rate are relatively independent (exogenous) followed by Interest rate and CPI which turn out to be relatively dependent (Endogenous). For the purpose of policy implications, we further move ahead to VDC and IRF (Generalized and Orthogonalized) which displayed consistent results that GDP is strongest leading variables and interest is the weakest variable. Reasoning behind interest rate to be the weakest is explained using Modigliani and miller capital structure approach. Finally we shocked the complete cointegrating relationship and found that, 10 periods are required for the variables to regain equilibrium and revert back to cointegrating relation.

8- Policy implications:

Findings of our research are partially in line with the established theories in the conventional framework. This is due to the fact that Islamic stock markets have a different set of characteristics which is explained by the sector weightage and the capital structure of the Islamic companies. GDP is found to be the strongest variable affecting other variables followed by interest rate to be the weakest. GDP is a broad measure of economic activity and signals the economy's health which directly affects the profit of the firm. Policy makers should constantly try to adjust their policies in order to maintain a stable GDP growth, or else it would hurt the corporate profits leading to a fall in stock prices. It's very important to note that equity markets are more susceptible to movements of GDP than the conventional bond markets. And since the Islamic stocks are based on equity relationship it is obvious that GDP will affect the Islamic market more than conventional market. Interest rates are found to be the weakest variable most probably due to capital structure component of Islamic stocks and components of Dow Jones Islamic. Given this fact it shouldn't be neglected by the policy makes as interest could have an indirect effect on the Islamic stock market since they work in an interest driven economic framework. Above results concluded are based on United Kingdom stock market and economic parameters, results from these research can be applied to economies possessing similar functional framework.

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