Impact of Interest Rate, Inflation Rate, Exchange Rate and Gold Prices on Karachi Meezan Index 30

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Abstract— Stock market performance has a significant impact on Economic Development of a country. Stock markets are supposed to be affected by different financial and macro-economic variables such as gold and oil prices, inflation rate, interest rate, exchange rate and unemployment rate etc. This study is an attempt to find the impact of financial and macro-economic variables on Karachi Meezan Index 30, the first Islamic Stock Index in Pakistan. Monthly data from July 2011 to June 2016 of the variables KMI Index 30, Interest rate, Inflation rate, Exchange rate and Gold price is used in this study to find the impact of selected variables on KMI 30 by using Multiple Regression Model. The empirical result shows that there is a negative relationship of KMI 30 Index with Interest rate and Gold prices whereas a positive relationship exists between Exchange rate and KMI 30 Index. Inflation rate does not show a significant relationship with KMI 30 Index in our Regression Model.

Keywords-component; Shariah Compliant Stocks, KMI 30, Interest rate, Exchange rate, Inflation rate, Gold price, Multiple Regression

I. INTRODUCTION

Pakistan is one of those countries where we have witnessed a significant development in Islamic Banking and Finance sector in the last decade. The growth of Islamic Banking & Finance sector fascinated and encouraged the investors to capitalize on the available opportunity of investment in Shariah Compliant products. The behavior inevitably resulted in the introduction of the first Islamic Market Index known as Karachi Meezan Index 30 (KMI 30) in the month of September 2008.

Karachi Meezan Index 30 was created in the year 2008 by the joint effort of Pakistan Stock Exchange, which was formerly known as Karachi Stock Exchange, and Al-Meezan Investment Bank. The first Islamic Index of Pakistan measures the performance of Shariah Compliant equity investment. Al-Meezan Investment Bank offers the Shariah expertise, guidelines and stock screening while Pakistan Stock Exchange is Incharge for upkeeping and spreading help for the index. The index is calculated by using the free float market capitalization method. The level of index at any time indicates the free-float market value of the selected Shariah permissible shares in connection to the base period. The index takes 15,000 as the base value and June 30, 2008 as a base period. The index comprises of Islamic banks and financial institutions and other companies which are regarded as Shariah compliant companies after the stock screening criteria. The stock screening criteria consist of six factors [18]. These factors are briefly explained in the following paragraph.

In order to be a qualified Shariah compliant company, the core business of the investee company should be Halal for e.g. Automobile, Manufacturing concerns, Textile etc. In addition, the interest-bearing debt (e.g. Bonds, TFC's, Commercial Paper, Conventional Bank loans, Finance Lease etc.) to asset ratio should be less than 37 %. Also, Non-Compliant Investment (e.g. Investment in T-Bills, PIBs, Conventional Mutual Funds, Conventional Money Market Instrument, etc.) to total asset ratio should be less than 33%. Further, Non-Compliant Income (e.g. Income from gambling, income from interest based transactions, income from Gharar based transactions i.e. derivatives, insurance claim reimbursement from a conventional insurance company, any penalty charged on late payment in credit sale etc.) to Total Revenue (Gross revenue + any other income by the company) ratio should be less than 5%. Next, Illiquid Asset (e.g. Inventory of raw material, work in process, all fixed asset, stock in trade etc.) to Total Asset ratio should be at least 25%. Finally, Market price per share should be at least equal to or greater than net liquid asset per share.

The framework of Islamic finance is based on Islamic Shariah or Islamic Law. The Islamic finance rules prohibits interest when lending money to lenders or investment in businesses, prohibits excessive risk and speculation and imposes asset backed security and equity participation. The moral and ethical rules together with the high degree of caution of Islamic investments make Islamic finance a promising alternative for improved performance [16]. With recent development in Islamic banking and finance the Islamic

financial markets are also growing. There is not enough literature available which specifically focus the impact of financial and macro-economic variables on Shariah compliant indices. This study is an attempt to study the impact of financial and macro-economic variables on Shariah compliant stock i.e. KMI 30 based on the available literature related to conventional stock market.

The study of different financial and macro-economic variables consequences on stock returns was previously done by numerous academicians and Economists. It is evident from the literature that the empirical result of the studies varies because of the fact that the behavior of the financial markets is different in different parts of the world. Since, the stock markets are considered to be the barometer of economic condition in a country therefore many researchers claimed that the stock prices are affected by the economic and financial variables which are the representative of overall economic condition of a country. Investor believed that some elementary macro-economic variables such as interest rates, inflation rates and exchange rate can be used to determine the stock prices. As argued in previous study that monetary policy and macro-economic factors have a considerable influence on the volatility of the stock prices [10].

In pure Islamic Economic System, firms would not have interest sensitive assets or liabilities. Therefore, the issue of interest rate sensitivity of stock return would not be relevant. However, in a market economy, the value of a firm can be influenced both directly and indirectly by interest rate [22]. In case of conventional market, the relationship is significant as it is supposed to be an inverse relationship between stock prices and interest rate. This is because the interest rate is used to discount the future cash flows of a financial asset and increase in interest rate gives rise to the required rate of return on stock prices. In other words, an increase in interest rate results in increase of required rate of return which consequently decrease the stock price. Theoretically, the relationship is depicted in a study by French French, K. R., Schwert, G. W., & Stambaugh, R. F. (1987). The study claimed that the stock returns responded negatively to both the long term and short-term interest rates [9]. In comparison, Allen and Jagtianti (1997) in their empirical study claimed that the interest rate sensitivity to stock returns has decreased dramatically since the late 80's and the early 90's because of the invention of interest rate derivative contracts used for hedging purposes [5].

Naeem and Rasheed (2002) claimed that there is no theoretical consensus on the relationship between stock prices and exchange rates either. When the causation runs from the stock prices to exchange rate, there is a negative relationship between stock prices and exchange rate. On the other hand, the price of stock increases when the direction of causation runs from exchange rate to stock prices due to depreciation in domestic currency [17]. As argument by Abdalla, I. S., & Murinde, V. (1997), changes in exchange rates affect firms' exports and ultimately affect stock prices. If the foreign investor invests in the stock market he will convert his return to foreign currency [1]. Therefore, appreciation in domestic currency will decrease the return of foreign investor which consequently decreases the stock price. By this approach the stock price is negatively related to exchange rate.

Inflation and stock returns have a negative relationship as higher inflation rate tends to increase the cost of borrowing. This leads to affect the firm borrowing which eventually result in decrease of stock returns. Empirically the results are validated the above relationship in numerous studies. For instance, Gultekin (1983) used time series regression and claimed that there is consistent lack of positive relationship between stock returns and inflation in most of the countries [12]. Geske and Roll (1983) argued that there is a positive relationship between the US stock prices and the real economic activity and inflation rate is negatively related to the US stock prices [11].

Historically, gold was the safest investment opportunity for the investors. In comparison to stock, bonds or bank deposits, gold was considered more lucrative investment in past. Even in present time, in most of the developing countries, investor trusted gold as an attractive investment. Especially, during the period when sock markets are crashing, the gold is regarded as an ultimate investment choice for the investors. With the evolution of commodity exchange, gold derivatives are now traded all over the world. Therefore, the fluctuation in gold prices can influence the stock prices. Empirically, Shahzadi & Chohan (2010) studied the impact of gold prices on Karachi Stock Exchange 100 index and concluded that there was a negative relationship between gold prices and KSE 100 index [21].

Above discussion leads us to the conclusion that there are theoretical and empirical evidences that the interest rate, inflation rate, exchange rate and gold prices have a significant impact on the return of conventional stock markets. We use the discussions and empirical findings from the literature as the basis of our study to evaluate the relationship of our selected variables on Karachi Meezan Index 30.

II. LITERATURE REVIEW

A. Literature related to Global Stock Indices

Different theoretical frameworks and statistical methods were used by international researcher to study the impact of macroeconomic indicators on stock returns. For instance, Fama (1981) based his empirical study on Arbitrage pricing theory and model a short run relationship between the macro-economic variables and stock return. The empirical test of the model proved that real stock returns are positively related to measure of real activity such as capital expenditure, average real rate of return and output while inflation is negatively related to stock return [8].

Chen, N., Roll, R., & Ross, S. (1986) in their study based on Efficient Market Theory conclude that stock returns are influenced by the spread between long and short-term interest rate, expected and unexpected inflation, industrial production and oil prices. They conclude that unexpected and expected

inflation, risk premium and long and short-term interest rate have a significant relationship with stock returns [7].

Gan, C., Lee, M., Yong, H. H. A., & Zhang, J. (2006) studied the interaction of seven macroeconomic variables (Inflation rate, money supply, long term interest rate, short term interest rate, exchange rate, Gross Domestic Product and Domestic retail oil prices) of New Zealand economy on New Zealand Stock market (NZSE40). By using Granger causality test and Johansen multivariate Co- integration test on the monthly data from the year 1990 to 2003 they concluded that inflation rate had a negative impact on NZSE40 [10].

Vector auto regression technique was used by Al-Mutairi & Al-Omar (2007) on monthly data of Kuwait Stock Exchange from the year 1995 to 2005 to investigate the relationship of money supply, inflation rate, government expenditure and interest rate on stock returns and find that all four variables have a slight impact on stock returns. They conclude that there is a negative relationship of interest rate and inflation rate on the stock returns. While the both money supply and government expenditures have a positive relationship with stock returns [4].

Humpe and Macmillan (2009) compare the impact of selected macro-economic variables i.e. industrial production, consumer price index, money supply and long-term interest rate on US and Japan market using 40 years monthly data from 1965 to 2005. They claimed that for US market the stock prices are positively related to industrial production and negatively related to consumer price index and long-term interest rate while there is an insignificant relationship of money supply with stock prices. From Japanese data, they found that industrial production is positively related to stock prices while stock prices have negative relationship with money supply [15].

(Quadir 2012) in his article investigate the effect of Treasury bill, interest rate and industrial production on Dhaka Stock Exchange stock returns. By using Autoregressive Integrated Moving Average (ARIMA) model on the monthly data from the year 2000 to 2007 he concluded that there is a positive impact of industrial production and Treasury bill on stock return [19].

Abdullah and Hayworth, (1993) in their studies investigate the relationship of trade deficit, budget deficit, short-term and long-term interest rate, and money growth with the stock returns. Using Vector Autoregressive Model granger causality on monthly data from 1980 to 1988 found that the stock returns are positively related to money growth and negatively related to budget deficit, trade deficit and short-term and long-term interest rate [2].

Herve, Chanmalai, & Shen, (2011) investigate the role of macro-economic variables which include industrial production index, consumer price index, domestic interest rate, real exchange rate and real money supply on stock prices index of BRVM10 of Cote d'Ivoire stock market. They used quarterly data from 1991 to 2007. They concluded that domestic interest rate and consumer price index are the indicators to predict the stock prices [14].

B. Literature related to Pakistan's Stock Indices

Similar studies have been done in Pakistan to find the relationship and impact of different macroeconomic variables on stock returns of different stock exchange.

For instance, Khan (2012) use Multiple Linear Regression Model on KSE 100 index data from 2001 to 2010 to find the impact of inflation rate, exchange rate and interest rate on stock returns [3].

Sohail & Hussain (2009) in his study use Vector Error Correction Model (VECM) on monthly data of Lahore Stock Exchange from 2002 to 2008 and found that there exists a positive impact of money supply, industrial production, and effective exchange rate on stock return while inflation rate on the other hand negatively affect the stock return.

Rafay (2014) using Granger causality test and Implemented regression analysis, on the data from 1992 to 2012 and studied the impact of interest rate, import & export, and exchange rate on KSE 100 Index and found that there is no causal relationship exist between inflation, export and KSE 100 Index. However, regression analysis indicated a strong positive relationship between imports and KSE 100 Index.

Basit (2013) in his study investigate a relationship between Oil and Gold prices and KSE 100 indexes by using simple linear regression model on the monthly data from the year 2005 to 2011 and find out that there is no significant relationship between KSE 100 Indexes and Oil and Gold prices.

Similarly, Shahzadi & Chohan (2012) find the impact of change in Gold price on stock exchange by using Augmented Dickey Fuller test, Granger Causality test and Johansen's Co Integration test on data from the year 2006 to 2010. It was found that there is a negative relationship exists between change in oil prices and Stock Exchange [21].

Similar model study has been done by Hanif, M., Shah, Z. A., & Iqbal, A. M (2015) on Shariah compliant stock return of KSE 100 Index. By applying Co integration test and Augmented Dickey Fuller test on macroeconomic data from 2001 to 2010 and Market Index he investigated the impact of real sector variables (i.e. Export, FDI, Gold prices, Oil prices, Industrial production and Worker Remittances) on Shariah Compliant stock return of 97 non-financial companies screened by Al-Meezan Investment Management Ltd [13].

III. RESEARCH DESIGN

The research process includes the collection of data, formulation of conceptual framework, framing of regression model, formulation of hypotheses and postulating estimation method.

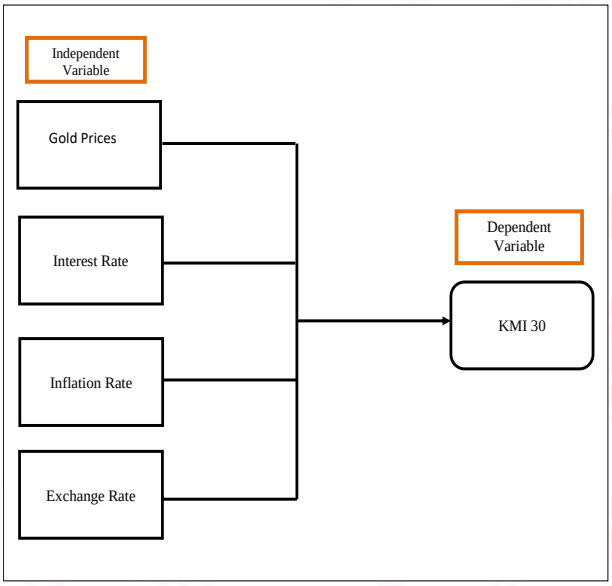
The objective of this paper is to find the empirical evidences to answer the following research questions:

1. Is there any significant impact of gold prices, interest rate, exchange rate and inflation rate on Karachi Meezan Index 30?

2. Which variable in this study has more significantly impact the Karachi Meezan Index 30?

A. Conceptual Framework

Considering the existing literature, following figure will represents the conceptual framework of the study. The KMI 30 is dependent or response variable. On the other hand, gold prices, interest rate, inflation rate and exchange rate are classified as independent or explanatory variables.



B. Theoretical Frame Work:

The paper implements the Multiple Regression Analysis to determine the dependence of KMI 30 on gold prices, inflation rate, interest rate and exchange rate. Stock markets are supposed to be affected by different financial and macro-economic variables such as gold and oil prices, inflation rate, interest rate, exchange rate and unemployment rate etc. As far as the investment decisions are considered, inflation rate, exchange rate, interest rate and gold prices play a vital role in an economy which affects the investment decision of an investor. Change in Interest rate affects the availability of funds in an economy which eventually result in change in investment decision. Similarly, appreciation or depreciation of foreign currency with respect to local currency affects the return of foreign investors which result in change in investment decision accordingly. Also, unstable inflation rate affects the profit rate which affects the investment decision of investor. During the period in which there is a slump in stock markets the investors consider the gold as the trusted investment opportunity and started to invest in their capital in gold which eventually affect the stock market index. Therefore, in this study we classified KMI 30 Index as a dependent variable and interest rate, exchange rate, gold price and Inflation rate as an independent variable.

C. Hypotheses

Following hypotheses are formulated for the study:

H_0: The relationship between KMI 30 and selected variables (Gold price, Interest rate, Exchange rate, and Inflation rate) is not significant.

H_1: The relationship between KMI30 and selected variables (Gold price, Interest rate, Exchange rate, and Inflation rate) is significant.

IV. METHODOLOGY

A. Statistical Method

The study uses the Multiple Regression Model to find evidence that the change in financial and macro-economic variable affects the Shariah Compliant stock market of an economy. This study is a quantitative study which utilizes the empirical data to find the relationship and impact of selected macro-economic variables on KMI 30 index. The relevant data is extracted from the websites of State Bank of Pakistan, Pakistan Stock Exchange and World Bank.

B. Data

Secondary data is used to analyze the relationship of the selected financial and macroeconomic variables (i.e. interest rate, inflation rate, exchange rate, and gold price) on KMI 30 Index. Karachi Meezan Index 30 is categorized as the response or dependent variable in this study. While, Interest rate, Inflation rate, Gold price and Exchange rate are categorized as the explanatory or independent variable. The Monthly data from July 2011 to June 2016 is utilized for KMI 30 Index, Interest rate, Exchange rate, Gold prices and Inflation rate. The discount rate (which represents the interest rate) and exchange rate data is obtained from State Bank of Pakistan website. The exchange rate will be PKR to USD conversion rate of the defined time period. For Inflation rate, we use CPI data from State Bank of Pakistan website since it is the primary indicator to measure Inflation. Gold prices data (in troy ounce) is obtained from World Bank commodity price data available at World Bank website. Karachi Meezan Index 30 monthly data is obtained from Pakistan Stock Exchange website.

C. Regression Model

The study employs Multiple Regression Model which is as under:

$$KMI = \beta_0 + \beta_1(Ir) + \beta_2(Inf) + \beta_3(Er) + \beta_4(Gp) + \mu \quad (1)$$

Where,

KMI= KMI 30 Index

Ir= Interest rate

Inf=Inflation Rate

Er=Exchange rate

Gp=Gold Price

μ=Error Term

V. RESULT AND DISCUSSION

A. Descriptive Statistics

The descriptive statistics of the variables used in the study is exhibited in the Table.1 below.

Table.1

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
KMI 30 Index	60	40,850	13,595	20,062	66,163
Interest Rate	60	0.0949	0.0204	0.0625	0.140
Inflation Rate	60	0.0689	0.0319	0.0132	0.124
Exchange Rate	60	98.99	5.892	86.12	107.7
Gold Price	60	136,758	15,207	112,728	166,668

If we look at Table.1 we will notice that interest rate and inflation rate data is symmetric but since, KMI 30 Index, exchange rate and gold price data are in different units so we should make them symmetric for our model. For this purpose, we will take the natural logarithm of exchange rate, gold prices and KMI data. After taken the logarithm we will calculate the descriptive statics of the variables again. Table.2 below depicts the descriptive statistic of the variable after taking the natural logarithm.

Table 2

VARIABLES	(1) N	(2) mean	(3) Sd	(4) min	(5) max
Log of KMI	60	10.56	0.364	9.907	11.10
Interest Rate	60	0.0949	0.0204	0.0625	0.140
Inflation Rate	60	0.0689	0.0319	0.0132	0.124
Log of Exchange Rate	60	4.593	0.0609	4.456	4.679
Log of Gold Price	60	11.82	0.110	11.63	12.02

B. Regression Result

Our basic regression model is:

$$KMI= \beta_0 + \beta_1(Ir) + \beta_2 (Inf)+\beta_3 (Er)+\beta_4 (Gp)+\mu$$

Since we have taken the logarithm of KMI and Exchange rate and Gold Price therefore, after the log transformation we need to modify our regression model. We can rewrite our model as:

$$logKMI= \beta_0 + \beta_1(Ir) + \beta_2 (Inf)+\beta_3 \log (Er)+\beta_4 \log (Gp)+\mu$$

Table.3 below reports the summary of our regression model.

Table.3

Source	SS	Df	MS	Number of obs	60
				F(4, 55)	178.01
Model	7.25818067	4	1.81454517	Prob > F	0.000
Residual	0.560656573	55	0.010193756	R-squared	0.9283
				Adj R-squared	0.9231
Total	7.81883724	59	0.132522665	Root MSE	0.10096

The Prob > F value from above value represent that our regression model is statistically significant and has explanatory power with the R-squared value of 0.9283. We conclude that 92.83 % variation in KMI 30 index is explained by interest rate, exchange rate, inflation rate and gold prices.

Table.4 below reports the result of our regression model.

Table.4

VARIABLES	(1) Log of KMI
Log of Exchange Rate	2.349***
	(0.405)
Log of Gold Price	-1.171***
	(0.175)
Interest Rate	-3.869*
	(1.988)
Inflation Rate	-1.400
	(1.079)
Constant	14.07***
	(3.239)
Observations	60
R-squared	0.928

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We observe that the p-values of log of exchange rate and log of gold price are statistically significant. In comparison the p-values of interest rate and inflation rate are higher. This might be because of the collinearity between the two variables. Variance inflation factor (VIF) is a statistical measure which can be used to identify the multicollinearity between the predictor variables. The results of VIF are shown in the table below:

VIF

Variable	VIF	1/VIF
Ir	9.53	0.104982
Inf	6.84	0.146116
logEr	3.52	0.283903
logGp	2.14	0.466906
Mean VIF	5.51	

The VIF value is > 5 for interest rate and inflation rate which shows that the collinearity exist between interest rate and inflation rate. We will now use correlation matrix and check the correlation between our variables.

Correlation Matrix of coefficients of Regress Model

e(V)	Ir	Inf	logEr	logGp	_cons
Ir	1.0000				

Inf	-0.806	1.0000			
logEr	0.6497	-0.3238	1.0000		
logGp	0.148	-0.3938	0.3102	1.0000	
_cons	-0.5072	0.4611	-0.8025	-0.8156	1.0000

The correlation matrix provides the evidence that there is a high correlation exist between the interest rate and inflation rate. Because of the collinearity between these two variables the p-values of the interest rate and inflation rate are not significant in our regression model. To deal with this, we either have to exclude interest rate or inflation rate from our regression model and run the regression again. We will exclude the inflation rate from our regression model and test our regression model again. The regression model summary and results of the regression model after removing the inflation rate are given below in Table.5 and Table.6.

Table.5

Source	SS	df	MS	Number of obs	60
				F(3, 56)	233.93
Model	7.2410282	3	2.41367605	Prob > F	0.0000
Residual	0.5778091	56	0.010318019	R-squared	0.9261
				Adj R-squared	0.9221
Total	7.8188372	59	0.132522665	Root MSE	0.10158

The value of R-Squared shows that our regression model is significant and has explanatory power. The value of Prob > F shows that the 92.61% variation in KMI 30 index is explained by our predictor variables i.e. the interest rate, exchange rate and gold prices.

Table.6

VARIABLES	(1) Log of KMI
Interest Rate	-5.947***
	(1.184)
Log of Exchange Rate	2.179***
	(0.385)
Log of Gold Price	-1.260***
	(0.162)
Constant	16.01***
	(2.891)
Observations	60
R-squared	0.926

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

From above results we conclude that the interest rate, exchange rate and gold prices have significant impact on KMI 30 Index. The coefficient of interest rate is -5.947 which represent 100bps increase in interest rate would decrease the KMI 30 Index by 5.94 %. Also, there exist a positive relationship between exchange rate and KMI 30 index. The coefficient value of exchange rate is 2.179 which employs that with 1% change in exchange rate there is 2.19 % change in KMI 30 index. As far as gold prices are concerned, there is a negative relation between Gold price and KMI 30 index. The coefficient value of 1.26 explains that with 1% increase in gold price there is 1.26 % decrease in KMI 30 index.

VI. CONCLUSION

This paper uses the Multiple Regression Model to estimate the impact of selected financial and macro-economic variables i.e. interest rate, exchange rate, inflation rate and gold price on Karachi Meezan Index 30 of Pakistan Stock Exchange. We use the monthly data from July 2011 to June 2016 for this study. Results from our regression model are basis to accept the hypothesis that interest rate, exchange rate and gold prices have a significant impact on KMI 30 Index.

On the basis of our Multiple Regression Model results, we conclude that, in comparison to other variables used in this study, there is a strong negative relationship between the interest rate and KMI 30 index. We have removed inflation rate from our model because of high correlation between the interest rate and inflation rate. The other two variables (i.e. gold prices and exchange rate) also depict significant relationship with KMI 30 Index. The gold prices are negatively related to the KMI 30 Index. In comparison, exchange rate has a positive relationship with the KMI 30 index.

Since, Islamic banks and other Islamic Financial Institutions use interest rate as benchmark for their profit calculation. This is one of the reasons that KMI 30 index reflects the strong negative relationship with interest rate. The results support the need of separate Islamic Interbank Benchmark Rate. In Pakistan, gold is always a safest investment alternative and the empirical result of our model validate the fact that the investors prefer to invest in gold in order to compensate their loss when stock markets are not performing well. As far as the exchange rate is concerned, the policy makers need to stabilize the exchange rate. This will restrain the outflow of capital and improve the confidence of foreign investor.

In this study limited variables are used to find their relationship with KMI 30 Index. More financial and macro-economic variables can be used in future for further studies. Also, Islamic index from other countries can be added in the future to study the comparison between stock indices of different countries by using advance statistical model.

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