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OIL PRICES, MACROECONOMIC FORCES, AND STOCK RETURNS: EVIDENCE FROM AN ARDL BOUND TESTING APPROACH

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ABSTRACT

The aim of the study is to explore the relationship among crude oil prices, selected macroeconomic variables and stock market index in Pakistan. The crude oil prices and selected macroeconomic variables such as interest rate, exchange rate, industrial production, gross domestic product (GDP), and unemployment rate are taken as independent variables while stock market index is taken as dependent variable. In order to capture the maximum variation in Stock Returns, time series analysis is done on monthly data from year 2001 to 2014 under the Multivariate Vector Autoregressive (VAR) framework. Unit root Test is employed to test the stationary of data. Co-Integration among the variables is tested by ARDL Bounds Test. Optimal lag length of return series is determined by Multivariate Akaike's Information Criteria (MAIC). Then the significance of the explanatory variables is examined within the F-Test framework. Finally the overall output of the model is assessed by Impulse Responses and Variance Decomposition methods.

Keywords: VAR; ARDL; Impulse Response; Variance Decomposition; Macroeconomic Variables; Stock Market Return.

1. INTRODUCTION

Economic development of an economy is highly dependent on investment rate. Stock market plays a very significant role both for investors and firms in equity financing and portfolio management decision. Stock market provides the place where investors can invest their excess funds in different companies based on stock price fluctuation. Stock price fluctuation is caused by the riskiness of underlying assets, which are fundamental factors of the company, and many other external macroeconomic factors. Marker share, profit margin, growth and expansion in term of new product and market development represent fundamental company specific factors that affect stock return. But, there is strong evidence that external macroeconomic indicators not only affect stock price and stock market return but also indirectly affect company's fundamental factors. There is also a significant relation among different economies due to the existence of international economic ties; no economy is isolated from external global economy.

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Similarly, the impact of crude oil price plays a pivotal role in almost every sector in an economy. Volatility in crude oil prices and its significance in an economy make it one of the most dominant macroeconomic variables which effect financial stability, whether it is import or export based economy. An increase in oil prices is beneficial to oil exporting countries while a decrease is beneficial to oil importing countries. The high volatility in the oil prices, after Lehman Brothers bankruptcy in September 2008 and European economic crises 2010 drew the attention of various researchers to study its impact on economy and stock market return. Pakistan is one of the oil importing countries in the world. Transportation and power generation sectors consume 47% and 43% of total oil in Pakistan. Most of the electricity is produced by thermal power which consumes 52 percent of the oil in Pakistan (Economic Survey of Pakistan, 2013-14). Above stated factors make economy of Pakistan very sensitive to crude oil price fluctuations. On the other hand, crude oil price also has a significant influence on the industrial production, GDP and exchange rate. These variables in turn affect the investment decision in the stock exchange in an economy because of the fact that it affects stock market return.

Various studies empirically observed negative relationship between oil prices and stock market return in US (Hamilton, 2003, 2011), Europeans and Asian countries. Hamiltion 2011 also concludes that oil prices also play a significant role in predicting real economic activity.

Researchers have conducted various studies to examine the factors that affect stock market return. The capital asset pricing model (CAPM) was developed by Sharpe, Lintner, and Treynor, (Sharpe, 1964; Lintner, 1965; Treynor, 1961) which states that security return is affected by both market risk and underlying security risk, and investor are compensated for both. However, this theory has empirical flaws. Ross (1976) introduced a more modern approach Arbitrage Pricing Theory (APT) for security return calculation. The APT states that security return is highly affected by many macro-economic factors and for that the investors should be compensated. The impact of macroeconomic factors on stock prices is also studied on the basis of market efficiency. The efficient market hypothesis argues that share prices reflect all the available information, no investor can outperform in an efficient market. Fama (1970) developed three forms of market efficiency that are (i) strong from of EMH (ii) Medium from of EMH and (iii) weak form of EMH. However, due to absence of market efficiency the investor can earn more return.

In Pakistan, many researchers have conducted on the impact of macroeconomic variables on stock market return. However, as per author's review of literature, this study used the macroeconomic variables which have not been used by other researchers in Pakistan.

Gracia et al. (2016) studied the impact of oil price fluctuation on stock return in G7 countries and suggests further study of oil price fluctuation and its impact on stock market in oil importing and oil exporting countries. These factors drew the attention of the researcher to study the impact of crude oil prices on industrial production, GDP, unemployment, exchange rate and stock market. The study explored the impact of macroeconomic variables on stock market index in Pakistan.

1.1. Significance of study

Pakistan Stock Market has shown a significant potential for foreign investment in recent years. In 2002 Karachi Stock Exchange, the biggest stock market in Pakistan was the best performing market in terms of the local market index. In 2013 it was declared as the world's second best performing stock market recording a 37% rate of return in US dollars and 49% in local currency (Azher & Iqbal, 2016). This makes the Stock Market of Pakistan an important venue for foreign investment. However, foreign portfolio investment comes with additional sources of risk and uncertainty. As arbitrage pricing theory

of Ross (1976) mentions that multiple factors are there to determine the stock returns and influence the movement of stock indices. Hence the study aims to examine both long term as well as short term association of Stock market with key macroeconomic variables in Pakistan. The study has implications for policymakers and investors in deciding about financial investment, real assets investment and portfolio diversification.

2. INSIGHTS FROM LITERATURE

Several researches have been conducted to study the impact of oil prices and macroeconomic factors on stock market return. Numerous studies utilize the industrial production index as a proxy for financial conditions. The development of production index will be steady with the normal development of firms' sales and cash flows. Along these lines, the industrial production index ought to be helpful in the asset pricing model (Chen, Ross, and Roll, 1986).

Habibullah and Baharumshah (1996) found that in short run money supply is positively related to stock prices while a negative relation was found in the long run. Huang et al. (1996) conclude in their study that an increase in oil prices effect the cash flow of a company by effecting interest rate that is used in discounting the cash flow, which in turn affects the stock prices of the company.

Nasseh & Strauss (2000) in their study revealed that share price and local and global macroeconomics factors are strongly correlated to each other in six European countries i.e. UK, Germany, Italy, France, Switzerland and Netherlands. The finding of variance decomposition indicates that local and global economic activity predicts the volatility in stock prices from 37% to 82%. They also concluded that share price movement is influenced by interest rate, business views, CPI and industrial production.

Wong and Sharma (2002) studied the macroeconomic variables and its impact on stock prices in ASEAN-5 (Indonesia, Malaysia, Thailand, Singapore and Philippines). They found a long run positive correlation between economic growth and stock prices. They also found that stock prices are a function of macroeconomic variables in short run.

Ibrahim and Aziz (2003) found that industrial production and consumer price index are positively related to equity prices in Malaysia. However, exchange rate and money supply have negative relation with the share prices.

McMillan (2005) studied the impact of variation in short term interest rate and industrial production on the US stock prices. The result shows a negative relation between interest rate and stock prices while a positive relation was found between industrial production and stock prices.

Basher and Sadorsky (2006) analyzed the volatility of oil prices and its impact on stock market in 21 emerging countries. The result shows a significant positive relation with the stock market return for most of the economies. However, this relation is positive at 10% significant level.

Samitas & Kenourgios (2007) studied the influence of local and global macroeconomic factors on four new European countries (Czech Republic, Poland, Slovakia and Hungary) and four old countries. USA is taken as international macroeconomic factors because of the trade relation with them. The co-integration and causality test was run on the data from period 1990 to 2004. They found that industrial production has a significant impact on the stock prices in UK, France, Italy, Germany and Poland, while interest rate has significant effect on the stock prices in Poland, Hungary, Slovakia and Czech Republic.

They also concluded that local macroeconomic indicators have a greater influence on stock price than the international macroeconomic variables.

Gay (2008) studied the impact of oil prices and exchange rate on the stock index return of Brazil, Russia, India and China. He found no significant impact of the oil prices and exchange rate with any of the four countries. An increase in the oil prices effect the discount rate used in the valuation formula of stock return, because fluctuation in oil prices lead to inflationary problem in an economy and to control the inflationary problem the central bank increased the interest rate (Henriques and Sadorsky, 2008).

Humpe and Macmillan (2009) used a co-integration analysis and found that there is a positive relationship between the industrial production index and stock prices in both the US and Japanese market.

Kilian and Park (2009) analyzed in their study that there is a relationship between oil prices and stock market either positive or negative based on nature of the economy, whether the economy is import based or export based for the oil. They also revealed that the relation between oil prices and stock market return is dependent on the demand and supply factors in the oil market for the oil.

According to (Al-Fayoumi, 2009), in case of perfect competition in the market if a company is unable to pass the higher cost of production due to rise in oil prices to its customers, then the profitability of a company decreases leading to low dividend which in turn decreases the stock prices in the stock market.

The study of Mahmood and Dinniah (2007) examined the long term and short term co-movement between the independent economic variables and dependent variable that is equity market return in six Asian-Pacific countries. The independent variables used in the study were exchange rate, output and inflation. The result of Johansen Juselius Co-integration showed that there is a long term correlation among variables in all countries except from Malaysia. However, no short term relation was found in any country. But, exchange rate is correlated in the short term to Hong Kong equity market, and out is correlated to share prices of Thailand in short run.

Singh, Mehta and Varsha (2011) analyzed the relationship between macroeconomic variables and portfolio return for the stock listed in Taiwan stock index for the year 2003 to 2008. A sample of 50 registered companies was taken for the analysis. The regression and Kolmogorov D statistic normality test was used to find the relation and impact of independent variables on the dependent variables. The result concluded that exchange rate and GDP have significant effect of all portfolio return and exchange rate, inflation and money supply has inverse relation with the portfolio return of big and medium companies.

Kumar and Puja (2012) studied the impact of exchange rate, money supply, industrial production, treasury bills rate and whole price index on the India stock market (BSE Sensex) for the period of 1994 to 2011. The result of co-integration and vector error correlation model revealed that there is a co-integration among independent and dependent variables. A positive relation was found between stock prices and money supply and industrial production, however, inflation is negatively related to the stock prices. The insignificant relation was observed between stock prices and inflation and treasury bills rate. The result of Granger causality test shows bidirectional causality to stock prices, whereas the exchange rate, inflation, money supply and treasury bills rate found out to be unidirectional to stock prices.

Khan (2014) studied the impact of macroeconomic variables on the KSE-100 index for the period of 1991 to 2011. The macroeconomic variables used in this study are interest rate, inflation, exchange rate

and gross domestic product. The regression test is used to study the impact of independent variables on the dependent variables. He found that GDP, Inflation and exchange rate have significant positive relation with stock prices while interest rate is negatively related to the stock prices.

After a comprehensive review of existing literature a gap has been identified in the exploration of interaction among Stock market and key macroeconomic indicators. To the best of author's knowledge no any study did the same work on the given variables together in Pakistan. Moreover existing studies create ambiguity by showing mixed results. For example Qayyum & Kemal (2006) found significant association among forex and stock market in Pakistan, where Rafiq & Hasan (2016) and Barakat et al. (2016) reported opposite findings about the same variables. This happens mostly when insufficient assumptions are held about the variables, or when inappropriate techniques are applied. The study provides a careful analysis by meeting the necessary assumptions while specifying the models. Also the long run and short run association is undertaken from two separate dimensions according to the analytic properties possessed by the variables.

3. METHODOLOGY AND DATA

3.1. Data set and Collection

The aim of the study was to investigate the impact of oil prices and selected macroeconomic variables on stock market return. The study investigated the impact of oil prices and macroeconomic variables on the stock market return for the period of July 2001 to December 2014 in Pakistan. Monthly data was collected from various sources. The data on oil prices and macroeconomic variables was collected from the World Bank website *(www.worldbank.org)*, International Monetary Fund website (*www.imf.org*), trading economic website (*www.tradingeconomics.com*), and economic survey website. The data on stock market index was collected from KSE-100 index website (www.kse.com.pk).

Table 1: Description of the Variables

Variable	Description
KSE-100 index	Log of monthly stock market Prices of Pakistan
Crude oil	Log of monthly crude oil denominated in US dollar
Interest rate	Log of monthly interest rate
Exchange rate	Log of monthly Exchange rate in term of US dollar
Industrial Production	Log of monthly industrial production index
GDP	Log of monthly GDP growth rate
Unemployment	Log of monthly unemployment rate

The researcher usedproportional Denton (1971) method of interpolation of a low-frequency time series by use of an associated higher-frequency indicator series to convert quarterly or yearly data into monthly.

3.2. Research Methodology and Model Specification

Researchers used various techniques to investigate the impact of macroeconomic variables on stock prices based on purpose and type of the data. Samitas (2007) used co-integration and causality test to analyze the impact of macroeconomic variables on stock prices in four new European countries. Gjerde and Seattem (1999) used vector auto regression model. Similarly, McMillan (2005) used vector error

correlation model (VECM) while Nasseh and Strauss (2000) used the multiple regression model to study the impact of macroeconomic variables and stock prices.

In this study, the researcher appliedARDL Bounds Test for Co-Integration introduced by Pesaran, Shin, and Smith (2001) to detect the existence of Long run relationship among variables. ARDL Bounds Test do not require all of the variables to have the same order of integration and only requires that none of the variables should be integrated at second difference i.e. I(2).

To check the stationarity of the variables, the unit root test was applied on the series of the variables using Augmented Dickey Fuller test (ADF, Dickey and Fuller, 1981) and Philip Perron (PP, Phillips and Perron, 1988). The null hypothesis is that variable has a unit root (non-stationary), while the alternative hypothesis is that variable is stationary. The ADF test statistic equation is as follows:

$$\Delta z = \gamma_1 + \gamma_{2t} + \beta z_{t-1} + \pi \sum_{t-1} + \mu_i \qquad (1)$$

Equation 1 is the ADF unit root equation where $\gamma_1$and γ_{2t} is a constant and trend term respectively, μ is the error term and Δ is the difference of the operator. The null hypothesis is $\beta=0$ that is, the variables have unit root (non-stationary) whereas $\beta\neq0$ that is, the variables are stationary at its level.

The PP test equation for the unit root is as follows:

$$\Delta z = \alpha_1 + \alpha_{2t} + \pi z_{t-1} + \mu_i \qquad (2)$$

In equation 2 α1 and α2 is the constant and trend term. The null hypothesis for the PP test is that, thevariable has a unit root which is denoted by $\pi = 0$ and the alternative hypothesis is that the variable is stationary at level and can be expressed as $\pi \neq 0$.

The ARDL co-integration equation for study is as follows:

D(KSE) = C(1)*D(KSE(-1)) + C(2)*D(INTEREST) + C(3)*D(FOREX) + C(4)*D(FOREX(-1)) + C(5)*D(FOREX(-2)) + C(6)*D(OIL) + C(7)*D(GDP) + C(8)*D(GDP(-1)) + C(9)*D(INDUSTRIAL) + C(10)*D(UNEMPLOYMENT) + C(11)*(KSE - (C(12)*INTEREST(-1) + C(13)*FOREX(-1) + C(14)*OIL(-1) + C(15)*GDP(-1) + C(16)*INDUSTRIAL(-1) + C(17)*UNEMPLOYMENT(-1) + C(18)))

Where "D" stands for first difference.

The null hypothesis of the co-integration is, there is no co-integration among the variables whilst the alternative hypothesis is that, there is minimum one co-integration exists among the variables. If Co-Integration exists between the variables then F-Statistic value will be greater than the upper bound's critical value of the test.

4. EMPIRICAL ANALYSIS

4.1. Unit Root Test

The empirical analysis of the study is comprised of three phases. In the first phase, the researcher measured the stationary of the variables by applying unit root test. In unit root test, the Augmented

Dickey Fuller test (ADF, Dickey and Fuller, 1981) and Philip Perron (PP, Phillips and Perron, 1988) tests were applied to determine whether the variables are stationary or not. For analysis, the following hypotheses were developed and tested;

Null Hypothesis: The variables have unit root (Non-stationary).
Alternative Hypothesis: The variables are stationary.

In ADF and PP tests for unit root there are two criteria for rejecting the null hypothesis and accepting the alternative hypothesis. If the probability value is less than 0.01 at 1 percent confidence interval or less than 0.05 at 5 percent confidence interval; then the null hypothesis is rejected and the alternative is accepted which means that the variable is stationary. The second criterion is that if the absolute value of test statistic is greater than critical values, the null hypothesis is rejected and alternative is accepted. In either case, the null hypothesis is accepted.

Table 1.1: Unit Root Test

	Level		**First Difference**	
	Intercept	**Linear, Trend**	**Intercept**	**Linear, Trend**
			ADF test	
Index	1.840202	0.202329	-12.03896**	-12.29913**
Crude oil	-2.219200	-2.608687	-9.3629**	-9.41134**
Interest	-1.304893	-2.535287	-11.38708**	-10.93034**
Exchange	0.200983	-2.776927	-7.721677**	-7.839979**
Unemployment	-1.728573	-1.109537	-2.91518****	-2.947874****
GDP	-6.33936**	-6.88637**		
Industrial Production	-2.174686	-1.628183	-4.620599**	-4.901621**
			PP test	
Index	1.840202	0.182968	-12.05336**	-12.29913**
Crude Oil	-2.152274	-2.541374	-9.4765**	-9.46898**
Interest	-1.670901	-2.694183	-11.38708**	-11.39482**
Exchange	0.405612	-2.646597	-7.66213**	-7.795541**
Unemployment	-1.160229	-1.067039	-3.895249****	-3.854428****
GDP	-1.657552	-1.771987	-4.086226****	-4.064993****
Industrial Production	-1.802129	-4.14085**	-15.07975**	-15.11954**

Note: ** denotes significance at 1% and 5%. **** denotes significance at 2nd difference.

Table 1.1 shows unit root test (at level and at first difference) for all variables related to Pakistan's economy. The test result shows that all the variables are non-stationary at their levels both in ADF and PP test because the test statistic value is less than the critical values and it is also insignificant, while they are stationary at the first difference. But the data for unemployment becomes stationary at first difference without intercept and trend. The ADF test result of monthly GDP indicates that it is stationary at its level, but PP test shows non-stationary of the variable at its level. For this problem, the researcher drew Corelogram for the monthly GDP which shows that GDP is non-stationary at level and becomes stationary at first difference.

4.2. ARDL Co-integration Test

The result of unit root for the variables related to Pakistan's economy revealed that only one variable is stationary at level, while they are all stationary at first difference. As all of the variables are not integrated of the same order i.e. **I**(1), So we cannot apply Engle-Granger (1987) or Johansen and Juselius (1990) test of Co-Integration which requires that all of the variables must have the same order of integration.

Therefore, ARDL Bounds Test for Co-Integration is applied to detect the long run relationship amount the variables. Optimal Lags are suggested by Akaike's Information Criteria and the test is conducted using EViews(Econometrics Software).

The null hypotheses for the model are as follows:

Ho: There is no log run relationship among the variables.
H1: There is long run relationship among the variables.

Table 1.2 shows the result for the co-integration test for the variables related to Pakistan economy. As the value of F-statistics is below the Lower bound Critical value, thereforethe null hypothesis of no long run relationship among the variables could not be rejected. This concludes that there is some long term relationship among the variables.

Table 1.2: ARDL Bounds Test

Null Hypothesis: No long-run relationships exist		
Test Statistic	**Value**	**k**
F-statistic	1.427626	3
	Critical Value Bounds	
Significance	I 0 Bound	I 1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.50%	3.69	4.89
1%	4.29	5.61

4.3. Unrestricted VAR Model

From the results of ARDL Bound Test we can conclude that no long run relationship exists among the variables. So in order to analyze the short run dynamics of the system, we will continue our analysis to Unrestricted VAR model by using the first difference series (or log normal returns) of the variables as calculated below:

$$R_t = [\log P_t - \log P_{t-1}] \times 100$$

Where,
R_t = Returns for period t
P_t = Price on day t
P_{t-1} = Price on day t-1
Log = Natural Log

4.3.1. Lag Selection Criteria

Sims (1980) argued that for a VAR to be Unrestricted, all of the variables must have the same order of lags. Optimal lag length is determined by using the Multivariate Akaike's Information Criteria (MAIC), which is assumed to be more consistent in defining the relationships among variables. Hence two Lags for each variable is selected according to the lag selection Criteria Shown in Table 1.3.

Table 1.3: VAR Lag Order Selection Criteria

Endogenous variables: KSE GOLD FOREX OIL			
Lag	**MAIC**	**MSC**	**MHQ**
0	-24.82392	-24.68527	-24.7676
1	-31.36688	-30.2577	-30.91631
2	-34.20000*	-32.12029*	-33.35519*
3	-34.07606	-31.02582	-32.837
4	-34.00015	-29.97937	-32.36684

Notes: * indicates lag order selected by the criterion; MAIC: MultivariateAkaike information criterion; MSC: Multivariate Schwarz information criterion; MHQ: MultivariateHannan-Quinn information criterion.

4.3.2. VAR Representaion

Estimated VAR equation for KSE-100 Index is given below:

KSE = 0.0367248170446*KSE(-1) - 0.192330953533*KSE(-2) -0.0889307629779*INTEREST(-1) - 0.088458447768*INTEREST(-2) + 0.480773070979*FOREX(-1) - 1.26505938509*FOREX(-2) - 0.00639520658798*OIL(-1) - 0.00320345597714*OIL(-2) - 1.02526567354*GDP(-1) + 1.12747152352*GDP(-2) + 0.146996190421*INDUSTRIAL(-1) - 0.012025746426*INDUSTRIAL(-2) - 0.201594203342*UNEMPLOYMENT(-1) + 0.0558915775645*UNEMPLOYMENT(-2) + 0.0248064050274

4.3.3. T-Distribution

To determine the significance level of the coefficient for every individual variable, t-statistic is used in the analysis. The critical value is determined from the t table and then compared it with the calculated t-statistic value in the analysis. To determine the critical value in the table, the researcher first determined the degree of freedom using the formula mentioned below:

$df = n - 1$

Where df is the degree of freedom, n is the total number of observation. The table below shows the t-tabulated value for level of significance at 1 and 5 percent.

Level of significance	**Degree of freedom**	**T-tabulated**
0.01	158	2.3508
0.05	158	1.6548

If t-calculated value is greater than the t-tabulated value, and then the coefficient of the variable is significant, otherwise, it is insignificant.

4.3.4. Coefficient Diagnostics

Significance of the Coefficients of all explanatory variables in the system is examined by t-test with the null hypothesis of no relationship between the variables. From the results as shown in Table 1.4, only 4 lagged variables and the constant term is significant, where the remaining 10 variables ar not significant. Probability values greater than 0.05 indicate that we cannot reject the null hypothesis of no relationship between the variables. Also the low values of R-squared and adjusted R-squared show that the variations

in KSE-100 index returns are not sufficiently explained by the given variables. Hence we can conclude that no significant relationship exists between KSE-100 index and the given macroeconomic variables.

Table 1.4: VAR Coefficient Diagnostics

VAR Equation
Estimation Method: Least Squares

	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	0.036725	0.083862	0.437919	0.6621
C(2)	-0.192331	0.084551	-2.274722	0.0244
C(3)	-0.088931	0.077101	-1.153425	0.2506
C(4)	-0.088458	0.073198	-1.208481	0.2288
C(5)	0.480773	0.624489	0.769866	0.4426
C(6)	-1.265059	0.623676	-2.028393	0.0444
C(7)	-0.006395	0.074248	-0.086133	0.9315
C(8)	-0.003203	0.075163	-0.04262	0.9661
C(9)	-1.025266	0.508175	-2.017544	0.0455
C(10)	1.127472	0.508853	2.215712	0.0283
C(11)	0.146996	0.076757	1.915088	0.0575
C(12)	-0.012026	0.079457	-0.15135	0.8799
C(13)	-0.201594	5.164809	-0.039032	0.9689
C(14)	0.055892	5.199571	0.010749	0.9914
C(15)	0.024806	0.00746	3.325245	0.0011
R-squared	0.140015	Mean dependent VAR		0.021035
Adjusted R-squared	0.056405	S.D. dependent VAR		0.079147
S.E. of regression	0.076882	Sum squared Resid		0.851167
Durbin-Watson stat	1.959147			

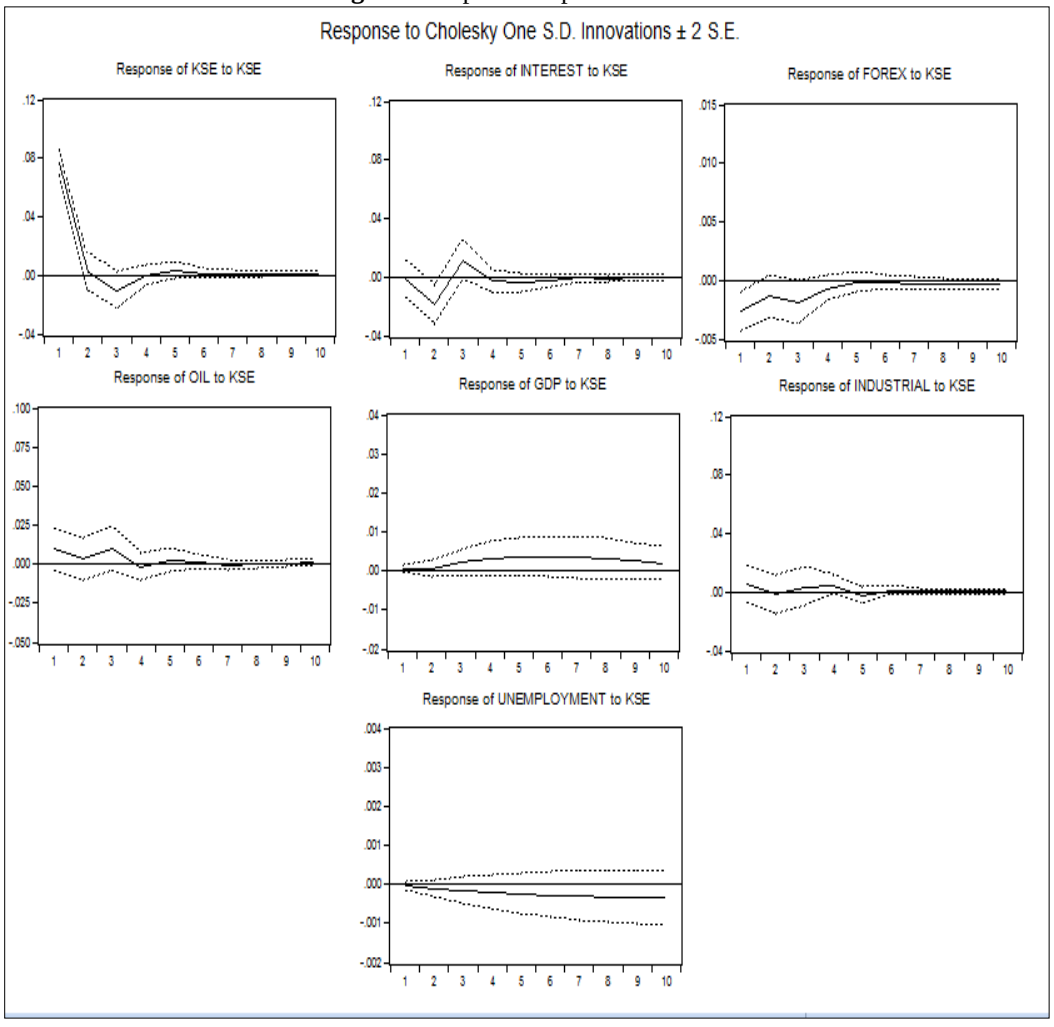
4.4. Impulse Response Function

Orthogonolised Impulse responses introduced by Sims (1980) are developed in order to examine the responsiveness of KSE-100 Index to shocks in each of the explanatory variable. Sims (1980) proposed that shock (or innovation) to a variable do not only affects itself but also the other variables collectively in the system. From the Output of Impulse response function as shown in fig. 1, we can infer that KSE-100 Index is almostinsensitive to all of the given macroeconomic variables. The response of KSE to itself is large and positive in the first period, small and negative in the second period and it ends in third period after the origination of shock. The shocks in GDP and Unemployment have a minimal but persistent impact on KSE-100 index. Where the shocks given by interest rate, forex, Oil Prices and industrial production also have a little impact on KSE-100 index but die away after 3 periods of origination. Alsohave ahead of the and less sensitive to shocks in other explanatory variables (See Figure 1).

4.5. Variance Decomposition

Variance Decomposition methodology as suggested by Pesaran and Shin (1998) is also employed in order to determine the proportion of s-period ahead forecast error variance of KSE-100 Index that is explained by its own lags as well as by the lags of other explanatory variables in the system. Results of Variance Decomposition as shown in Table 1.5, indicate that 90 percent variation in KSE-100 Index is explained by itself only, where 10 percent variation is explained by the shocks in remaining variablesin 10 periods ahead of the origination of shocks.

Figure 1: Impulse Response Function



***Note*:**the result of the response of KSE 100 index to the one standard deviation shock to each independent variable.

Table 1.5: Variance Decomposition of KSE

Period	KSE-100	INTEREST	FOREX	OIL	GDP	INDUSTRIAL	UNEMPLOYMENT
1	100	0	0	0	0	0	0
2	95.88964	0.610945	0.505316	0.06128	0.647185	2.285402	0.000226
3	93.38333	0.986077	2.448043	0.06034	0.936847	2.184428	0.000933
4	92.10064	0.981028	3.324281	0.253247	0.975659	2.364224	0.00092
5	91.66966	0.981496	3.486736	0.413051	0.970328	2.477786	0.000946
6	91.47699	1.014159	3.520736	0.487115	1.017386	2.481462	0.002153
7	91.25583	1.057689	3.524118	0.503518	1.174426	2.475883	0.008542
8	90.94763	1.097488	3.511869	0.502524	1.446422	2.469348	0.024723
9	90.55335	1.128361	3.502475	0.501742	1.79526	2.464941	0.053873
10	90.11714	1.15547	3.500916	0.504794	2.162598	2.463313	0.095767

5. CONCLUSION

Investment in the stock exchange is highly dependent on the riskiness and fluctuation in the share prices of a company. Company share price is affected by company's internal risk as well as external macroeconomic risk. Therefore, investors are very reluctant to the share price fluctuation while investing in the stock exchange. This study explored the external factors that affect the stock market return. The selected macroeconomic fundamentals that affect stock market return are crude oil prices, interest rate, exchange rate, industrial production, gross domestic product (GDP) and unemployment.

Monthly time series data from July, 2001 to December, 2014 was taken to determine the relation among the macroeconomic variables and stock market return. The macroeconomic time series data usually hasa stationary problem. To determine the stationary of the variables, the unit root test using ADF and PP test were applied on the data. The result of ADF and PP concluded that all the variables related to Pakistan's economy are non-stationary at level but they become stationary at first difference.

To determine the long run relationship among the variables, ARDL Bounds test was applied on the series of the data. The result of the co-integration test suggested no long run relationship among the variables. Findings of no-long run association are consistent among other studies conducted in Pakistan on different macroeconomic variables. See for example (Khan et al., 2016). This is because financial markets of different countries respond differently to other financial and macroeconomic variables depending on the economic and political environment where they operate. For example Ingalhalli, Poornima and Reddy (2016), and Mishra et al. (2010) found significant long-run assosiation between gold and stock markets in India. Where in Pakistan studies show no long run relation among the same variables (see; Bilal et al., 2013; Ali et al., 2010).

After assessing thelong run association among the variables the vector autoregressive model (VAR) was applied on stationary data series. The results of VAR also suggested insignificant association among the variables. Furthermore outputs from Impulse Response Function and Variance Decomposition method also indicate that KSE-100 Index returns are sufficiently influenced by the shocks in given macroeconomic variables.

On the basis of these findings, it is concluded that stock market of Pakistan lacks integration tokey macroeconomic indicators. This is because financial and capital markets in developing economies are usually more uncertain as compared to developedeconomies. Therefore, investors and policy makers must align their decisions with subjective knowledge about economic and political environment of the country in their investment and policy decisions.

5.1. Future Direction for Further Research

More macroeconomic variables i.e. GDP, FDI, CPI, Foreign Debt etc. could be included in the study in order to capture maximum variation in Stock Market Index of Pakistan where daily observations could be used instead of monthly observations could for more efficient estimation of the model. Moreover Semi-parametric models like Copula could be incorporated to gain more robust estimates of dependence structure.

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