

The Empirical Investigation of the Macroeconomic Factors Which are Affecting the Pakistan Economy: A Situation Prevailing in the Pakistan

Zia Ur Rahman, Department of Economics,

Preston University, Kohat, Pakistan.

ziaurrehman@preston.edu.pk, zia4939@gmail.com

Abstract

In the emerging economies gold price, oil price and the exchange rate are the key macroeconomic factors which can fluctuate the whole economy with a small change in their prices. That's why this study is conducted to investigate the shock wave generated by the gold, oil and the exchange rate, which are uncertain today and a small change in the gold price, have to pay more amount in case of oil price change and a currency decline in term of the other currency and cumulatively creates a scenario for the inflation. For this purpose, time series data were organized which was collected from the Handbook of Statistics comprises from 1968-2017. The ARDL approach illustrates that increase in the price of gold and exchange rate appreciated the inflation rate around 1.18 and 0.79 units respectively. Finally, impulse response function shows that all these factors would create shockwaves to destabilize the equilibrium and then the speed of adjustment assist the economy to attain equilibrium with the passage of time in the long run.

Keywords: Oil Prices, Gold Price, Exchange Rate and Structural Break.

JEL Coade: E31, E60, E61.

I. INTRODUCTION

There are many macro factors which disturb the growing process and creates a number of hurdles to de-track the economy from stabilization. The instability is the price of gold, oil and exchange have a substantial influence on the development as well as the emerging economy. These flexibilities can affect the growth process via consumer expenditure, cost of production and paying more amount against the same amount which smooth the way for the inflation and also effect on international forum (Yaziz et al, 2016; Benassy et al, 2007; Spagnolo, 2002). Well, developed economies have the capacity to bear the fluctuation in the supposed variable and moreover, big threats, internal affairs and externals security, such problems are not there, which diverts the attention of the government from the prosperity. Although, the emerging economy has to face many problems at a time and meanwhile has many distractions too (Benassy et al, 2007; Caporale & Pittis 2002).

The yellow metal (Gold), which is present behind the currency notes in every economy of the world and now a day gold stock improves the worth of the economy and the currency intrinsic value inside and outside of the economy. Moreover, gold has its own significance either it is developed nation or the emerging economy and also has its credibility in the invested sector and in the consumer field, although not used as a currency but it is the gold which is present behind every currency of the world. Khan (2015)

explores that exchange rate is directly connected with the yellow metal because both factors attract the investor considerably.

Secondly, the oil is the blood for all the economic sectors such as industry, transport and power sector. The intensity to use oil developed country is very high as compared to the emerging country. Moreover, in modern age oil is employed to generate power every sector of the economy, either it is school, home, transport, hospitals, even our aero plan is a piece of garbage if oil is not there. Due to the globalization importance of oil can't be explained in worlds. Pakistan depends on oil to fulfill its energy requirement (Economic Survey). Due to its importance, now oil is getting economic indicator in the growth process. And currently change in the price level of oil creates a shock which hit every sector of the economy because as expressed above that oil has to employ to power every sector of the economy. Moreover, when the prices go up, then home country has to pay more amount of money to get the oil to satisfy its requirement, indirectly influence the growth/productivity (Jayaraman and Lau, 2011; Aliyu, 2009; Akpan 2009).

The exchange rate, the internal currency value of emerging economies, is very low in the developed one and they have to pay a lot of their income to purchase anything from the developed country. However, exchange rate is expressed as the amount of the currency, which has to pay against any foreign currency (Fratzcher, 2009; Guar & Bansal, 2010). One important thing at this stage is to know about the floating exchange system and the fixed exchange system. In floating system, market forces determine the value of the currency. While, the fix is a method in which home currency is pegged to a widely recognize currency such as Saudi Arabia fix its riyal to the US dollar. Moreover, the foreign currency is demanded to speculate, capital inflow, foreign investment, tourism, investment across the nation and for the geopolitical reasons (Guar & Bansal, 2010; Fratzcher, 2009).

While in the perspective of interest rate, this works as an incentive for the speculation or increase the demand of one currency where investor earns more profit while purchasing the currency. For instant, if an investor can earn about 7.5% interest on depositing the USA, while paying the 1% interest for the speculation of Japanese yen then the investor buys the British pound instead of yen. Instead, all of this, the exchange rate value, in the context of growth play very important role in trade and monitored very carefully because it is the most observed, investigated and governmentally influenced economic processes (Economic Survey).

However, interest rate and exchange rate are strongly connected because state bank can influence the level of inflation and exchange rate in the economy while up/ down the rate of interest. Due to interest rate rise, lending in the economy or higher, return attracts the capital from other nation to the home country and became a reason to increase the exchange rate (Economic Survey). Stock and Watson (1999), Cecchetti, Chu and Steindel (2000), Boivin and Ng (2006), Banerjee and Marcellino (2006), all stated that gold has significant influence on the inflation because all other capital resources grow with regarding to the expected increase in the inflation but now gold is becoming an indicator which predicts about the inflation.

Moreover, it is said that gold and the exchange rate have close relation because they gave more benefit to the investor and the other business by providing the safe haven. No doubt the gold is not considered as the currency, but fluctuations in the gold prices are closely watched by the developed and the developing nations. Moreover, many nations of the world make their policies under the consideration of the gold prices. For example, the dollar is the widely accepted currency in the world, however gold is the dominated, but a change in the value of the dollar directly affects the prices of the gold in the market as well.

The history states that there is an inverse relation between gold prices and the (dollar) exchange rate. Similarly, the interest rate is another factor which affects the gold prices. Because when the interest rate is low, people move to buy gold instead of bonds and some other fixed income investment. Because the attraction to invest in the income-based speculation reduces its charm and also have the risk of substantial

decreases. And when the economy is facing the increase in the interest rate they massively move to invest in the bonds because bonds earning is more as compared to the gold.

It seems that there is no connection between the oil and gold prices, but if consider them in an inflationary environment it is clear that an increase in the price of oil will also lead the increase in the price of the gold as well (Khan, 2015). However, Cologni and Manera (2008) states that there are many factors which become a cause of inflation, such as oil prices and the rise in the prices in the commodity market like gold, silver, wheat and rice. While Fama and French (1987) conclude that changes in the prices of the commodity market significantly affects the inflation i.e. An increase in the prices of the gold, silver and wheat uplift the inflation rate in the economy. Similarly, Khan, Qasim and Ahmad (1996) state that a fluctuation in the exchange rate will also lead inflation in the economy. They concluded that a decrease in the value of Pak rupee against dollar increase the inflation.

The United Nations Economic and Social Commissions for Asia and Pacific (2008) and Asian Development Bank (2005, 2008) explore that increase in the oil prices the emerging nations have been hit severely and increase in the oil prices becomes a good new for the oil trading nations and bad news for the importing countries. Jayaraman and Lau (2011) coted in this context the example of the Papua, New Guinea which benefit from the increase in the oil prices.

If talk about the Pakistan which is the developing economy, is now under the strong influence of the exchange rate where the dollar is at its peak level of the history, which indirectly increased the external debt of Pakistan many folds and oil imports are increasing on a daily basis because the maximum portion of oil is used to generate energy to fulfil the gap between demand and supply of the energy. Moreover, gold is also leading the inflation in the economy. Because the fluctuation in the gold prices money is attracted and the amount of loanable funds decreased in the economy.

Why this study is different from the other or what this study is going to add in the previous literature, first of all this study introduce the structural breakdown in the data i.e. There are the data breaks in the consistency of the data. Secondly, the ARDL approach is utilized to elaborate the short and the long- term affiliation along with the speed of adjustment are employed. And to answer the most important question, i.e. Which variable granger cause whom variable and the direction of the causality.

Moreover, a number of diagnostics, coefficient and parameter stability tests were used to strength the model. Additionally, VAR along with the impulse response is utilized to capture the dynamic behavior of the factors which in turn affect the economic performance. This study under the consideration of the past behavior of the factors, will predict the behavior of the variable in the coming time frame as well.

However, the second chapter elaborates the literature review, third describe a theoretical framework along with data and the fourth one explains the result and discussion and the fifth comprises on the conclusion with suggestions.

2. LITERATURE REVIEW

Marx's theory postulates that a disruption in the intrinsic value of the gold can change the price level in the economy. Consequently, many hypothetical views were given to explore the asset prices-to-inflation transmission mechanism while positing the demand side of the economy as a catalyst. However, frequent opinions are unable to explain the relation over the years (Tufail and Batool, 2013).

To study the importance of the gold price and the commodity prices for the forecasting, general price level in the economy, Mahdavi and Zhou (1997) detect some proves of co-movement between commodity prices and the consumer price index (CPI). In the US economy, to observe interlink between gold price and the inflation Ghosh, Levin, Macmillan and Wright (2004) employ the co-integration while applying the data on a monthly level. And determines a co-integration in the postwar period and in 1970 for the said variables.

Although in Asian-Pacific region, Mahmood and Dinniah (2009) employed the inflation, exchange rates, output and the stock prices and find out that all the macro variables have a slight influence on the

stock market returns in the Thailand and Hong Kong economy. It was the Krugman (1983) and Golub (1983) whom detect the influence of oil price which affects the exchange rate and the co-movements in the economy. Golub (1983) says that in the US economy the influence of the oil price is more as compared to the dollar and an increase in the oil price uplifts the exchange rate (US dollar). While Krugman (1983) study is based on the association in the selected investment of oil exporters and fluctuation in the exchange rate. He concluded that an increase in the price of oil will increase the selected investment of the oil exporters. Krugman (1983) further depicts that if the increase in the price of oil deteriorate the current account which in turn reduce the exchange rate. Moreover, same results were found by the Bodenstein et al, (2011), Jean-Pierre Allegret et al, (2014) in their studies. Sadorsky (2000) stats that exchange rate affects the oil prices, similarly Akram (2009) also claims that depreciation in the dollar value smoothes the road for inflation in the economy. And currently Fratzscher et al. (2014) determines the two way causality between the dollar (exchange rate) and oil price.

To determine the co-integration and causality Zhang and Wei (2010) conducted a study and observed that oil price and gold price have a steady movement in the positive direction during the span of 2000-2008. They also found that flexibility in the price of oil has a causality with the fluctuating in the price of gold. Melvin and Sultan (1990) concluded that oil prices and the political disturbance in the economy has a significant influence on the gold rate. While Narayan (2010) is interested to capture the long-term association between oil and yellow metal under the consideration of the future prices in the perspective of the inflation and found the bidirectional causality.

However, Reboredo (2013) while utilizing the copula approach, for the association between oil-gold for the period of the 2000-2011 and found a significant and positive connection between them (Oil & Gold) gold price fluctuates with the change in the price of oil. And Wang and Chueh (2013) confirm the positive relation in the 1989 to 2007 for the gold and oil prices.

To capture the relation between stock prices and inflation ratio Muhammad, Rasheed and Husain (2002) conducted a cross country study while employing the panel regression and obtained fixed effect. And also elaborates that in the South Asian Countries inflation is influenced by the stock prices positively. Since Ajayi and Mougoue (1996) found a correlation between inflation and exchange rate and found that exchange rate plays a very important role to determine the inflation ratio.

While, Blose (2010) analysis states that oil price fluctuation could not predict the inflation in the economy. And the Worthington and Pahlavani (2007) found that the gold price negatively affects the inflation in the short and the long-time frame. To capture the correlation Khan, Qasim and Ahmad (1996) designed a study and found that in Pakistan economy exchange rate has a significant effect on inflation and the cause behind the phenomena is the depreciation in the Pakistani currency which in turn increase the general price level in the economy. Similarly, Chishti, Hasan and Mahmud (1992) say that discount rate and exchange rate determines the level of inflation in the economy and concluded in their study that it is the exchange rate, which affect the inflation negatively while the discount rate affects the inflation positively in the economy.

Omag (2012) conducted a study while employing the regression model to detect the relationship gold price, Istanbul Stock Exchange and exchange rate of the Turkish Lira and the dollar and found the positive association among them while utilizing the data January 2002 to December 2011.

While Apergis and Papoulakos (2013) employed the error correction model and the generalized autoregressive heteroskedasticity, to check the relation among Austrian dollar, US dollar, exchange rate and gold price and concluded a strong association among them and moreover exchange rate smoothes the way for the prediction of the coming gold price. Similarly, Subashini and Poornima (2014) state that crude oil, gold price and the Indian Rupee are interlinked with each other. And moreover, find out that an increase in the currency will uplift the price of the crude oil and gold price as well. While gold prices and exchange rate are affiliated in the long run and investors in India keep a close eye on the gold and oil prices (Bhunia and Pakira, 2014).

Patel (2013) investigation states that inflation, exchange rate and gold prices are co-integrated in the long term in the economy of India. Ibrahim et al (2014) states that an association of exchange rate and inflation with gold is negative while gold prices are positively affected by the change in the price of the crude oil. While Nazir and Hameed (2015) elaborate that oil price influence the gross domestic product positively in the short run, but its effect turns into negative in the long run. They come to know while employing the Cabb Daglous function in the scenario of the Pakistan.

Iqbal (2017) investigated a study in the context of three different countries such as India, USA and the Pakistan while employing the EGARCH model and found that vigorous results were estimated investing in the gold is better than the investing in the forex market precisely for Pakistan and India. Adding the above literature Mishra et al, (2017) utilizing the GARCH model in the atmosphere on India, publicize that Indian rupee goes down while increasing the oil price but both are symbiotic in a relationship.

In the perspective of above stated literature, a large gap is there which explores the fluctuating relation of gold prices, with oil prices to the inflation or the exchange rate with the gold and oil prices which indirectly uplifts the general price level. Now a day, all the concerning variables fluctuates on a daily basis, which creates a shock wave which hits the economy, one after the other and fluctuate the gross domestic product of the economy. This study incorporated the dynamic influence of the gold prices, oil prices and the exchange rate, which in turn generates the inflation in the economy and leads a negative influence on the gross domestic product.

3. THEORETICAL FRAME WORK AND DATA

Marx’s theory postulates that a disruption in the intrinsic value of the gold can change the price level in the economy. Consequently, many hypothetical views were given to explore the asset prices-to-inflation transmission mechanism while positing the demand side of the economy as a catalyst. However, frequent opinions are unable to explain the relation over the years (S. Tufail and S. Batool 2013).

Many models were designed to capture the influence of concern variable in the system of equation, everyone adds new factor and reform the old model to attain the required one like the macro model of Romer (2000, 2006), Taylor (1993, 1999 and 2001) and to detect the influence of oil. The model is as follows.

$$S = f(y, r, g, t, ps, ee, po) \tag{1}$$

Where y = real GDP, r = the real interest rate, g = real government spending, t = real government revenues, ps = the real stock price, ee = the real effective exchange rate, po = the real crude oil prices (Adiqa Kiani, 2009).

Further Akram (2009) reframe it for the production function such as $LY_t = f(LK_t, LL_t, LP_t, LOC_t, Dt, \mu_t)$, while LY_t = Log of Gross domestic product. LK_t = Log capital stock (K), LL_t = Log of labor force, LP_t = Log of average oil prices of Pakistan. LOC_t = Log of oil consumption. Dt = Dummy variable for in cooperating the effect of oil prices shocks to Pakistan’s economy. (Nazir S and Hameed T, 2015).

However, all the factors included in the model are well defined and have a deep-rooted economic belongings and are improved into the following conceptual model $\ln INF = f(\ln GP, \ln EXR, \ln DR)$ Where $\ln INF$ stands for the log of Inflation, proxied by the CPI index $\ln GP$: log of Gold Prices, $\ln DR$: log of Discount/Interest rate is Pakistan. $\ln EXR$ shows the log of Exchange rate (PKR per USD) Aleemi, Ahmad & Tariq 2018). Under the consideration of the above stated different model, the study develops such as.

$$\ln f = f(GP, OP, ER, GDP, IR) \tag{2}$$

While GP denotes the gold price, OP shows the oil price, ER for exchange rate, Inf for inflation ratio, IR for the interest rate and GDP is standing for the gross domestic product of the economy.

3.1 Data

All the data is collected from the economic survey of Pakistan (2017) except the inflation rate, which is collected from the handbook of Statistics, issued by the State Bank of Pakistan every year. The data cover the time period of 1968 to 2017. All the variables along with the source are presented in the Table 01.

Table 1 Data Source

Variable	Data Source
Gross Domestic Product (GDP)	Economic Survey
Gold Price (GP)	Economic Survey
Oil Price (OP)	Economic Survey
Exchange Rate (ER)	Economic Survey
Inflation Rate (INF)	Handbook of Statistics
Interest Rate (Intel)	Economic Survey

4. RESULTS AND DISCUSSION

To give the overview of variables, the study employs the descriptive analysis, which reports that the average values of the inflation, gold price, oil price, exchange rate, GDP and the interest rate are the 1.88, -0.63, 2.84, 3.16, 1.46 and 1.80 respectively, which lies between the minimum and the maximum range presented in the Table 2.

Table 2 Descriptive Analysis

Analysis	Ln Inf	Ln GP	Ln OP	Ln ER	Ln GDP	Ln Intel
Mean	1.88	-0.63	2.84	3.16	1.46	1.80
Median	1.97	-0.51	2.76	3.07	1.57	1.81
Maxi	3.28	2.30	4.53	4.65	2.42	2.63
Mini	-1.76	-3.59	1.56	1.56	-0.75	-1.76
Std. Dev	0.78	1.67	0.95	0.96	0.63	0.72
Skewnes	-2.10	0.03	0.22	0.04	-1.57	-2.73
Kurtosis	11.77	2.44	1.88	1.84	5.75	14.36
Jarq-Ber	0.11	0.58	2.69	2.53	32.91	2.29

Source: Author(s) calculation

However, to capture the fluctuation in a variable data, the study shows the trend of the data graphically in the fig 1. Which is generated while utilizing the data to elaborate the trends of the variables from 1968 to 2017 graphically.

It is already stated that macro data contain the stochastic feature, so to measure the zero mean and constant variance Augmented Dickey–Fuller (ADF) and the Phillips-Perron (PP) is employed to incorporate with the ZA test (Zivot and Andrews, 1992), which is designed to capture the endogenous structural break in the data. The Table 3 comprises on the results.

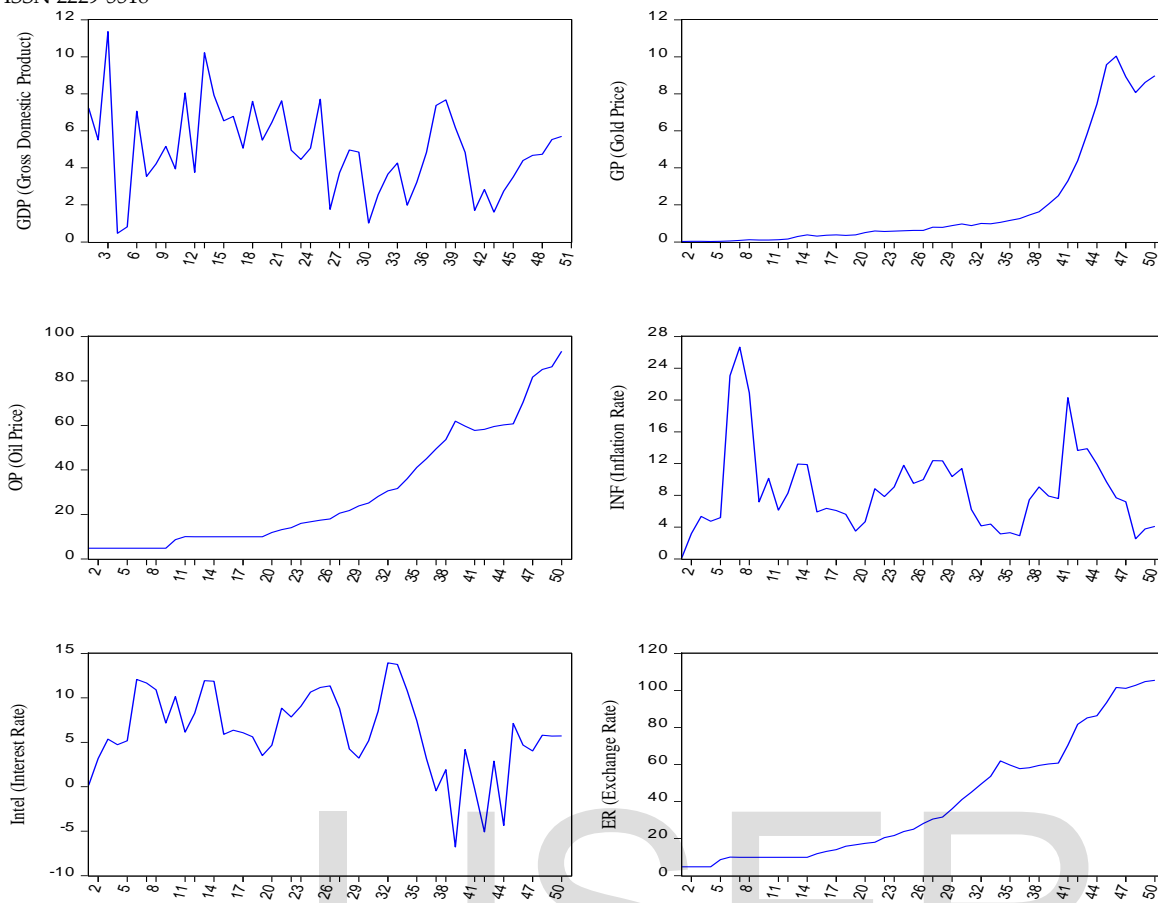


Fig1 Trends of the Data

Table 03 ADF, PP and ZA test Results

Variable	ADF Test		PP Test		Lags	I (0)	ZA Test	Structural Break
	T-Stat	Prob	T-Stat	Prob				
GDP	-5.65	0.00	-5.71	0.00	1	I(0)	-6.62	1992
GP	-4.31	0.00	-2.71	0.00	1	I(1)	-7.48	2006
OP	-3.90	0.00	-3.96	0.00	1	I(1)	-4.83	2000
ER	-4.47	0.00	-4.53	0.00	1	I(1)	-4.90	1995
INF	-6.82	0.00	-7.66	0.00	1	I(1)	-5.81	1980
Intel	-3.57	0.00	-3.66	0.00	1	I(0)	-4.79	2002

Source: Author(s) calculation

The outcomes depicted that all the factors are the stationery at the first difference except GDP and Interest rate which are stationary at the level. While ZA results states that GDP has the break in the data in the year 1992, gold in 2006, oil in the 2000, exchange rate in the 1995, inflation in the 1980 and interest rate in the year 2002 are determined. However, to find out the correlation among the factors, the correlation methodology is applied. The results are presented in the Table 04.

Table 4 Correlation

Variables	Ln Inf	Ln GP	Ln OP	Ln ER	Ln GDP	Ln Intel
Ln INF	1					

Ln GP	1				
Ln OP		1			
Ln ER			1		
Ln GDP				1	
Ln Intel					1

Source: Author(s) calculation

The outcome reports that the required level of correlation is prevailing among the inflation, gold price, oil price, exchange rate and interest rate. Before the study moves to the next step it is necessary to determine the suitable number of past values, for this purpose the lag length criteria are employed Table 05 denoted the results.

Table 5 Lag Length Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-863.30	NA	1.03e+08	35.48	35.71	35.56
1	-588.57	470.96*	6139.17*	25.73*	27.35*	26.35*

Source: Author(s) calculation

The AIC selection criteria states that one lag will be suitable for the research because we know that increase in the number of past values reduce the degree of freedom. Moreover, the AIC states the goodness of the fit of the model as well. However, the Johansen test for co-integration, which has two segments like trace and maxi-Eigen values, reports the long-term affiliation. The outcomes are presented in the Table 6 & 7 comprises on the trace, maxi-Eigen and the normalized output of the variables.

Table 6 Trace Value

Null Hypothesis (No)	Alternative Hypothesis (N ₁)	Eigenvalue	Trace Statistic	5% Critical Value	Prob.**	Hypothesized No. of CE(s)
No: f = 0	N ₁ : f ≤ 1	0.69	122.13	95.75	0.00	None *
N ₁ : f ≤ 1	N ₁ : f ≤ 2	0.52	77.01	69.81	0.01	At most 1*
N ₁ : f ≤ 2	N ₁ : f ≤ 3	0.45	48.44	47.85	0.04	At most 2*
N ₁ : f ≤ 3	N ₁ : f ≤ 4	0.31	25.37	29.79	0.14	At most 3

Source: Author(s) calculation

Table 7 Maximum Eigen Value

Null Hypothesis (No)	Alternative Hypothesis (N ₁)	Eigenvalue	Max-Eigen Statistic	5% Critical Value	Prob.**	Hypothesized No. of CE(s)
No: f = 0	N ₁ : f ≤ 1	0.69	45.11	40.07	0.01	None *
N ₁ : f ≤ 1	N ₁ : f ≤ 2	0.52	36.52	29.87	0.03	At most 1*
N ₁ : f ≤ 2	N ₁ : f ≤ 3	0.45	23.06	27.58	0.17	At most 2
N ₁ : f ≤ 3	N ₁ : f ≤ 4	0.31	14.25	21.13	0.34	At most 3

Source: Author(s) calculation

The estimations found that there are two equations which denied the null hypothesis i.e. There is no co-integration among the variables. Therefore, it is concluded from the results that all the variables like inflation, gold price, oil price, exchange rate, inflation and the gross domestic product are affiliated with each other in the long-term. Although, the ARDL approach is employed to determine the F-stat values which assist to define that at what percent the ARDL bound test is significant. The necessary condition for the ARDL approach. While the No: $\rho_0 = \rho_1 = \rho_2 = \rho_3 = \rho_4 = \rho_5$ while N₁: $\{\rho_0 \neq 0\} \cup \{\rho_1 \neq 0\} \cup \{\rho_2 \neq 0\} \cup \{\rho_3 \neq 0\} \cup \{\rho_4 \neq 0\} \cup \{\rho_5 \neq 0\}$. The results of the ARDL bound test are expressed in the Table 08.

Table 8 Bound Test Result

Upper Bound I(1)	Lower Bound I(0)	Significant	F-Stat	k
------------------	------------------	-------------	--------	---

3.00	2.08	1%	3.90	5
3.38	2.39	5%		
4.15	3.06	10%		

Source: Author(s) calculation

The output of the ARDL bound states that the at the 5 % level of significant is prevailing, when inflation is dependent and all the other factors such as gold price, oil price, exchange rate and interest rate are independent. Which suggest that the null hypothesis with no cointegration is rejected in contrast to the alternative with cointegration is accepted. Therefore, it is determined that long run affiliation among the factors exists. However, the elasticities of all the factors are mentioned in the Table 09.

Table 9 ARDL short and long-term Elasticities

Variables	Coefficient	Std. Error	T- stat	Prob.
Δ Ln GP	1.14	0.48	2.36	0.32
Δ Ln OP	0.05	0.65	0.08	0.93
Δ Ln ER	2.06	0.87	2.36	0.52
Δ Ln GDP	-0.05	0.16	-0.34	0.73
Δ Ln Intel	-0.09	0.18	0.50	0.63
Long Run Coefficient				
Ln GP	1.18	0.37	3.17	0.00*
Ln OP	-1.22	0.67	-2.83	0.07***
Ln ER	0.79	0.64	3.22	0.03**
Ln GDP	-1.52	0.40	-3.80	0.00*
Ln Intel	0.20	0.28	0.71	0.09***
ECT	-0.64	0.29	3.11	0.04**
Adjusted R ²	0.89			
AIC	-2.04			

Source: Author(s) calculation *1%; **5%; ***10% statistical level of significance

The results report that the coefficient of the gold price and the exchange rate are significantly and positively influence the inflation in the economy in the long term while the short term there is no influence of the coefficient with the inflation. However, the terminology ECT elaborates the short-term adjustment towards the equilibrium i.e. Negative and probability is in the range, which is required. Therefore, ECT 64% means that factors adjust towards equilibrium about 64% annually. Moreover, the result also depicts that a one unit increase in the gold price and exchange rate it will increase the inflation in the economy about 1.11units in case of gold and 2.03 units in case of exchange rate respectively.

However, to determine the causality among the factors, the granger causality test was employed. The necessity of this approach is that everyone is interested to know about that who granger cause whom factors, therefore granger causality was employed. The results are presented in the Table 10.

Table 10 Granger Causality Results

Null Hypothesis:	F-Statistic	Prob.
Ln GP does not Granger Cause Ln Inf	3.86	0.05
Ln Inf does not Granger Cause Ln GP	0.32	0.57
Ln OP does not Granger Cause Ln Inf	2.66	0.10
Ln Inf does not Granger Cause Ln OP	0.05	0.82
Ln Intel does not Granger Cause Ln Inf	4.28	0.04
Ln Inf does not Granger Cause Ln Intel	0.34	0.56
Ln ER does not Granger Cause Ln Inf	2.69	0.10
Ln Inf does not Granger Cause Ln ER	0.30	0.58
Ln GDP does not Granger Cause Ln Inf	0.17	0.67
Ln Inf does not Granger Cause Ln GDP	0.43	0.51
Ln OP does not Granger Cause Ln GP	3.96	0.05
Ln GP does not Granger Cause Ln OP	1.54	0.22
Ln Intel does not Granger Cause Ln GP	0.01	0.90
Ln GP does not Granger Cause Ln Intel	3.56	0.06
Ln ER does not Granger Cause Ln GP	3.27	0.07
Ln GP does not Granger Cause LNER	0.12	0.73
Ln GDP does not Granger Cause Ln GP	2.55	0.11
Ln GP does not Granger Cause Ln GDP	0.00	0.948
Ln Intel does not Granger Cause Ln OP	0.13	0.71
Ln OP does not Granger Cause Ln Intel	2.87	0.09
Ln ER does not Granger Cause Ln OP	9.12	0.00

Ln OP does not Granger Cause Ln ER	0.71	0.40
Ln GDP does not Granger Cause Ln OP	0.01	0.91
Ln OP does not Granger Cause Ln GDP	0.06	0.79
Ln ER does not Granger Cause Ln Intel	2.11	0.15
Ln Intel does not Granger Cause Ln ER	0.09	0.76
Ln GDP does not Granger Cause Ln Intel	0.45	0.50
Ln Intel does not Granger Cause Ln GDP	0.00	0.98
Ln GDP does not Granger Cause Ln ER	19.08	0.56
Ln ER does not Granger Cause Ln GDP	0.04	0.84

Source: Author(s) calculation

The results show that gold price granger cause the inflation, interest rate has one-way causality with the inflation and oil price has a granger cause with the gold price. While gold price has the granger causality with the interest rate and exchange rate granger cause the gold price. Oil price granger causes the interest rate even exchange rate granger causes the oil price. Consequently, it can be declared that all the factors granger causes each other and had one-way causality from gold price to oil price, interest rate to inflation, oil price to gold price, gold price to intel, exchange rate to gold price, oil price to interest rate, exchange rate to oil price.

The study will employ some diagnostic and stability test which empowers the statement about the concerning variables. Numerous residuals, co-efficient and stability strategies are utilized which are listed in the following table 11.

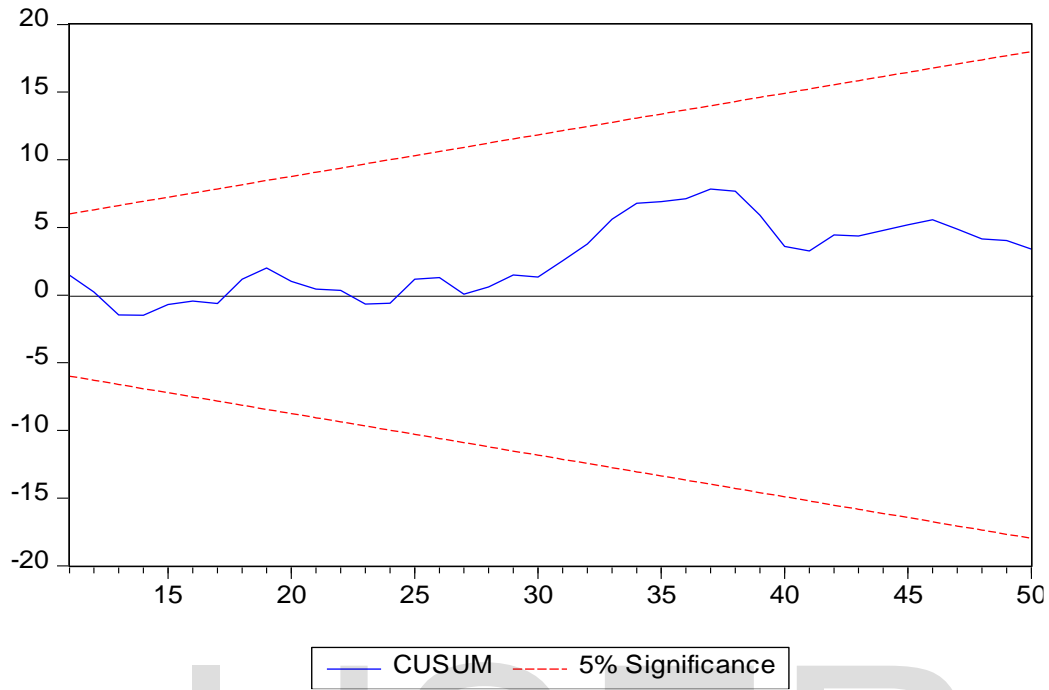
Table 11 Diagnostic Test

Heteroskedastic: Breusch- Pagan- Godfrey Test		
$X^2 - Statistics$	Degree of Freedom	Prob
	1	0.19
Breusch- Godfrey serial Correlation LM Test		
$X^2 - Statistics$	Degree of Freedom	Prob
	1	0.43
Jarque-Bera Test		
$F - Statistics$	Degree of Freedom	Prob
1.24	(2,34)	0.77
Ramsey RESET Test		
$F - Statistics$	Degree of Freedom	Prob
16.2	(1,39)	0.25

Source: Author(s) calculation

The output of the Breusch- Pagan (Engle 1982) and Breusch- Godfrey (Breusch 1978; Godfrey 1978) analysis, elaborate that there is no problem of the heteroscedasticity and the serial correlation in the model.

The examination of Jarque and Bera (1987) state that model specification is the normal. However, to examine the stability of the parameters the following tests are employed. Which are depicted in the fig 02 & 03.



Source: Author(s) calculation

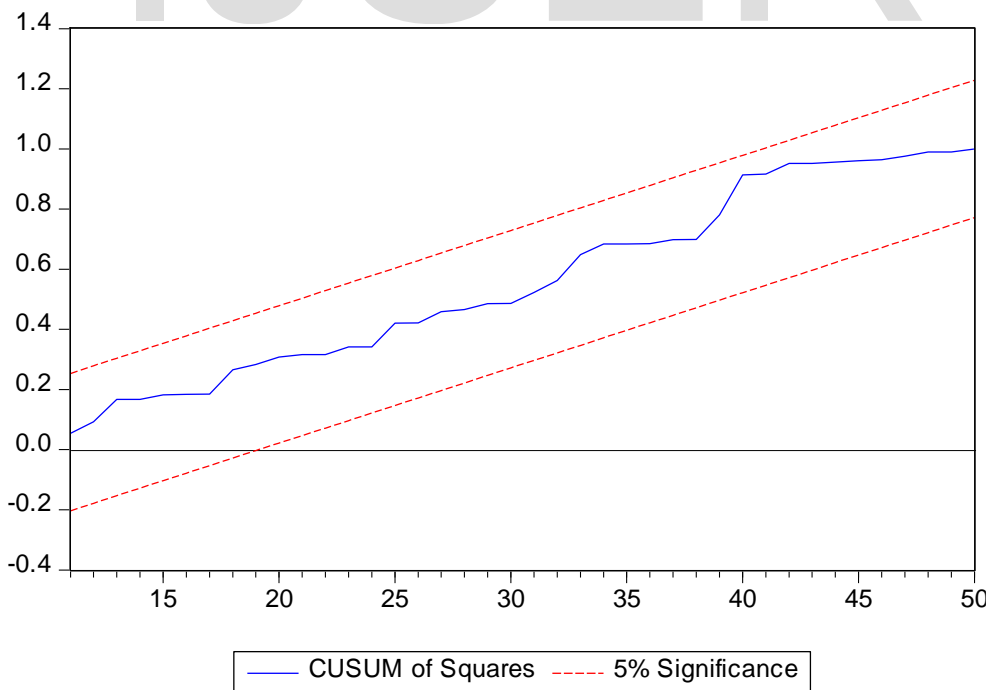


Fig 3 CUSUMQ Test

Source: Author(s) calculation

The above states fig 02 & 03 CUSUM and the CUSUMSQ are the test of the parameter’s stability both tests explain that parameters lie in the 5% significance level. In simple words the output of the model is in the favor of the study. Now study will employ the VAR technique which was introduced by the Sims (1980) to deal all the variables on the same line before that endogenous and the exogenous variable were a great hurdle in the way of estimating. And this technique beautifully draws the information which is hidden in the data. The results are expressed in the table 12.

Table 12 VAR Result

Variables	Ln Inf	Ln GP	Ln OP	Ln ER	Ln GDP	Ln Intel
Ln Inf	0.562081	0.020974	-0.039551	-0.004423	-0.305497	-0.108219
	(0.14506)	(0.06099)	(0.03491)	(0.02891)	(0.22435)	(0.12820)
	[3.87480]	[0.34391]	[-1.13281]	[-0.15299]	[-1.36167]	[-0.84412]

Source: Author(s) calculation

All of us well aware of that the results of VAR cannot be explained directly so study develops a system to find out the p-value which is significant. Moreover, to capture the behavior of the respective variable in the future the study employs the impulse response function (IRF). This technique beautifully elaborates the shock wave generated by the variable in the system. Han (2011) states that IRF is the suitable technique to elaborate the flexibility of the variable and assist to predict the future behave of the variable. The results of the IRF is mentioned in the fig 04.

IJSER

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.

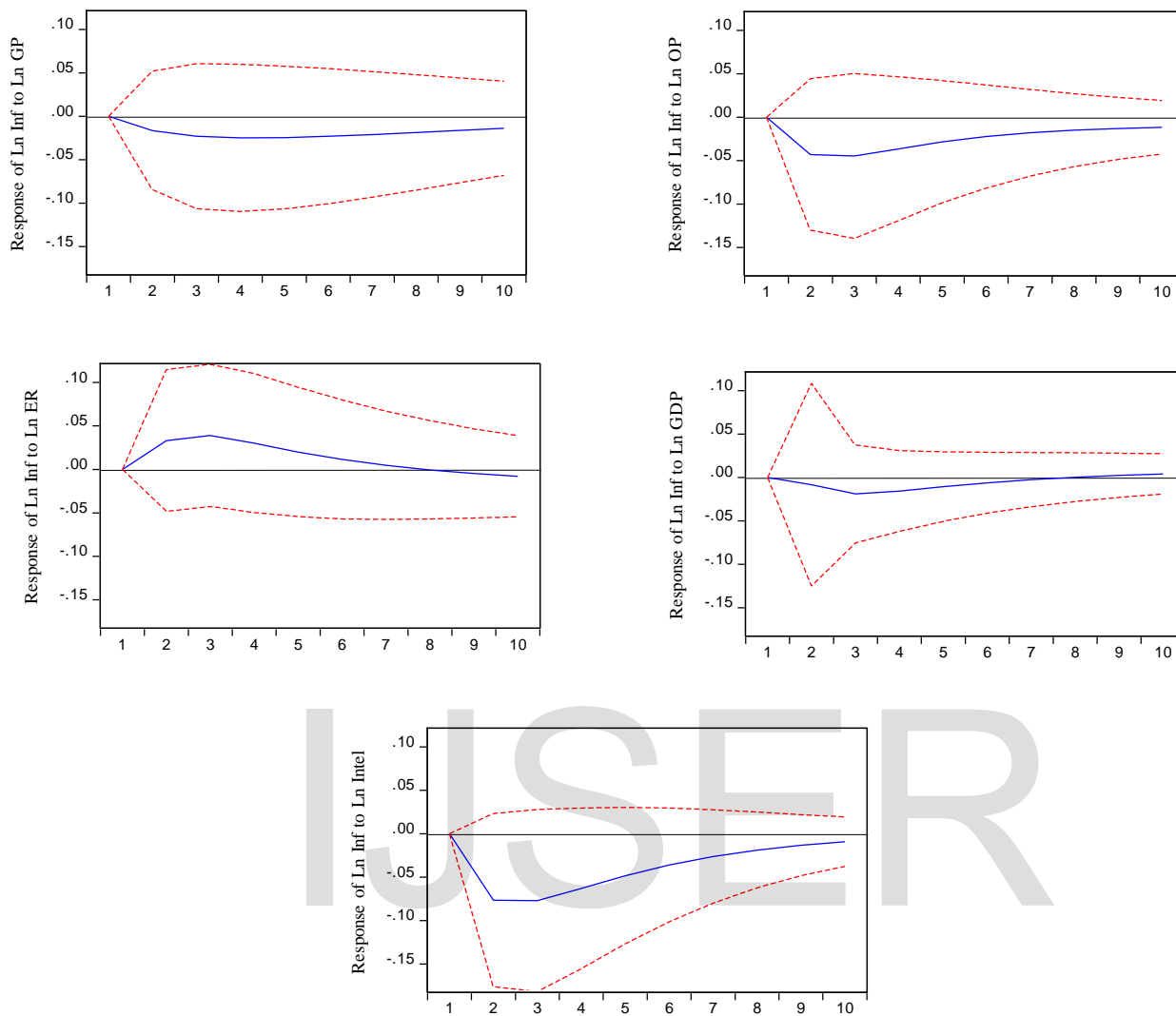


Fig 04 Impulse Response Function

Source: Author(s) calculation

The figure states that when a standard deviation shock of gold price is given to the inflation, then the reaction of the inflation would be initially positive and starts declines continuously while moving along with the equilibrium line in such a way that every period the inflation moves closer and closer towards the equilibrium line.

However, the fig elaborates that a price shock of the oil is given to the inflation, then the response of the inflation would be positive initially and then decrease till third year and starts to move towards the equilibrium line, with the passage of time moves very close the equilibrium line. Although, the interest rate behaves such as the oil. When a shock of standard deviation of the inflation is given to the exchange rate, then the inflation rate would be increased till 3rd period and starts to move towards the equilibrium line and attains the equilibrium in the 8th period and becomes negative after that. And the gross domestic product initially responded positively and start to decline very close to the equilibrium line and moves very close to the equilibrium line.

Consequently, we can illiterates the behavior of all the factors in the light of the results of the impulse response function. And in what direction they move, either they will respond positively or negatively in the future because IRF explains the coming time frame. However, the fluctuation in the gold

price, oil price and interest rate smooth a way, which declines the inflation in the economy while changes in the value of the exchange rate increases the inflation in the economy.

5. CONCLUSION

This study is conducted to investigate the affiliation of the gross domestic product, gold price, oil price, exchange rate, inflation and the interest rate. For this purpose, statistical data of all the concerning factors are collected from the Handbook of statistics, which is comprised on the time period from 1968 to 2017.

The prerequisite test of time series design about the suitable technique for the analysis, the ZA test elaborates that all the factor has a different structural point break in the data and all the factors are affiliated with each other in the long-time frame. Moreover, Johansen also elaborates that gross domestic product, gold price, inflation and the interest rate are positively correlated with each other.

The ARDL bound test elaborates that the factors are significant at the 5% level and all the variables have an influence on the inflation in the long term. Moreover, gold price granger causes the inflation, interest rate has one-way causality with the inflation and oil price has a granger cause with the gold price. While gold price has the granger causality with the interest rate and exchange rate granger cause the gold price. Oil price granger causes the interest rate even exchange rate granger causes the oil price.

To empower the worth to the model, numerous diagnostics, coefficient and parameter stability tests are employed, the analysis finds that all the results are in the favor of the study. However, the prediction technique (IRF) elaborates that when a shock of gold price, oil price, inflation and the interest rate are given to the gross domestic product then the response of gross domestic product would be positive.

On the contrary, IRF analysis determines that when the shock wave generated by the gold, oil, exchange rate, gross domestic product and interest rate then the response of the inflation remain fluctuating. Therefore, gold, oil, gross domestic product and interest rate contemporaneously reduces the inflation except exchange rate, which uplifts the inflation in the coming time-frame.

Under the consideration of the granger causality, it is clear that all the concerning variables are interconnected with others. Further investor continuously monitoring the price of gold so government should adopt the such policy which attract financial assistance rather than the gold mobilization. While government should produce energy rather than the high consumption of the oil, which creates pressure on budgets. Further exchange rate strongly relates to the gold and smooth the way for depreciation in the currency value and promote the inflation, should be monitored carefully.

References

- Ajayi, R. A., & Mougoue, M. (1996). On the dynamic relation between stock prices and exchange rates. *Journal of Financial Research*, 2, 193–207.
- Apergis, N. and Papoulakos, D. (2013), The Australian dollar and gold price, *The Open Economics Journal*, 6, 1 – 10.
- Akram, Q. F. (2009). Commodity prices, interest rates and the dollar. *Energy economics*, 31(6), 838-851.
- Akpan, E. (2009). Oil price shocks and Nigerian's macro economy. *Journal of Economics*, 4(2), 12–19.
- Aliyu, J (2009). Impact of oil price shock and exchange rate volatility on economic growth in Nigeria: An empirical investigation. *Research Journal of International Studies*, 11(8), 4–15.
- Allegret, J. P., Mignon, V., & Sallenave, A. (2015). Oil price shocks and global imbalances: Lessons from a model with trade and financial interdependencies. *Economic Modelling*, 49, 232-247.

- Allegret J.P. (2014). Yuan-dollar relations: from the "currency war" to international monetary and financial governance. *Humanities and Social Sciences*, 3(2), 80-85.
- Asian Development Bank. (2005). the challenge of higher oil prices. In Asian Development Bank (Ed.), *Asian Development Outlook 2005* (65–86).
- Asian Development Bank. (2008). *Asian Development Outlook 2008*.
- Banerjee, A., & Marcellino, M. (2006). Are there any reliable leading indicators for US inflation and GDP growth? *International Journal of Forecasting*, 22, 137–151.
- Benassy-Quere, A., Mignon, V., & Penot, A. (2007). China and the relationship between the oil price and the dollar. *Energy policy*, 35(11), 5795-5805.
- Bhunia, A. and Pakira, S. (2014), Investigating the Impact of Gold price and Exchange rate on Sensex, *European Journal of Accounting, Finance and Business*, 2(1), 1 – 11.
- Blose, L. E. (2010). Gold prices, cost of carry, and expected inflation. *Journal of Economics and Business*, 62(1), 35-47.
- Bodenstein, M., Erceg, C. J., & Guerrieri, L. (2011). Oil shocks and external adjustment. *Journal of International Economics*, 83(2), 168-184.
- Boivin, J., & Ng, S. (2006). Are more data always better for factor analysis? *Journal of Econometrics*, 132, 169–194.
- Caporale, G. M., Pittis, N., & Spagnolo, N. (2002). Testing for causality-in-variance: an application to the East Asian markets. *International Journal of Finance & Economics*, 7(3), 235-245.
- Cecchetti, S. G., Chu, R. S., & Steindel, C. (2000). The unreliability of inflation indicators. *Current Issues in Economics and Finance*, 6(4), 1–6.
- Chishti, S. U., Hasan, M. A., & Mahmud, S. F. (1992). Macro econometric modeling and Pakistan's economy: A vector autoregression approach. *Journal of Development Economics*, 38(2), 353-370.
- Cogni, Alessandro & Mantto, Matteo, (2008). Oil prices, inflation and interest rate in a structural cointegrated VAR model for the G-7 countries. *Energy Economics*, 30(3), 856-888.
- Engle, R. F. (1982). Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation. *Econometrica: Journal of the Econometric Society*, 987-1007.
- Fama, E. F., & French, K. R. (1987). Commodity futures prices: Some evidence on forecast power, premiums, and the theory of storage. *Journal of Business*, 55-73.
- Fratzcher, M. (2009). What explains global exchange rate movements during the financial crisis? *Journal of International Money and Finance*, 28(8), 1390-1407.
- Fratzcher, M., Schneider, D., & Van Robays, I. (2014). Oil prices, exchange rates and asset prices. ECB working paper.
- Gaur, A., & Bansal, M. (2010). A comparative study of gold price movements in Indian and global markets. *Indian Journal of Finance*, 4(2), 32-37.
- Ghosh, D. P., E. J. Levin, P. Macmillan and R. E. Wright and (2004), Gold as an Inflation Hedge? *Studies in Economics and Finance*, 22,(1), 1-25.
- Golub, S. S. (1983). Oil prices and exchange rates. *The Economic Journal*, 93(371), 576-593.
- Granger, C. W., Huangb, B. N., & Yang, C. W. (2000). A bivariate causality between stock prices and exchange rates: evidence from recent Asian flu. *The Quarterly Review of Economics and Finance*, 40(3), 337-354.
- Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross spectral methods. *Econometrica*, 37, 424-438.
- Ibrahim, S.N., Kamaruddin, N.I. and Hasan, R. (2014), Determinants of gold price in Malaysia, *Journal of Advanced Management Science*, 2(1), 38 – 41.
- Iqbal, J. (2017). Does gold hedge stock market, inflation and exchange rate risks? An econometric investigation. *International Review of Economics & Finance*, 48, 1-17.

- Jayaraman, T. K., & Lau, L. (2011). Oil price and economic growth in small Pacific island countries. *Modern Economy*, 2(2), 153–162.
- Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of economic dynamics and control*, 12(2-3), 231-254.
- Khan, H. (2015). The Impact of Oil and Gold Prices on the GDP Growth: Empirical Evidence from a Developing Country. *International Journal of Management Science and Business Administration*, 1(11), 34-46.
- Khan, A. H., & Qasim, M. A. (1996). Inflation in Pakistan revisited. *Pakistan Development Review*, 35(4), 747–759.
- Krugman, P. (1983). Oil shocks and exchange rate dynamics. In *Exchange rates and international macroeconomics* (pp. 259-284). University of Chicago Press.
- Le, T. H., & Chang, Y. (2012). Oil price shocks and gold returns. *International Economics*, 131, 71-103.
- Lombardi, M. J., & Van Robays, I. (2011). Do financial investors destabilize the oil price?
- Mahmood, W. M., & Dinniah, N. M. (2009). Stock returns and macroeconomic variables: Evidence from the six Asian-Pacific countries. *International Research Journal of Finance and Economics*, 30, 154–164.
- Mahdavi, S., & Zhou, S. (1997). Gold and commodity prices as leading indicators of inflation: Tests of long run relationship and predictive performance. *Journal of Economics and Business*, 49(5), 475–489.
- Melvin, M., & Sultan, J. (1990). South African political unrest, oil prices, and the time varying risk premium in the gold futures market. *The Journal of Futures Markets*, 10(2), 103.
- Mishra, S., & Debasish, S. S. (2017). Analysis of Volatility Spill Over between Oil Price and Exchange Rate in India: GARCH Approach. Available at SSRN 2892670.
- Narayan, P. K., Narayan, S., & Zheng, X. (2010). Gold and oil futures markets: Are markets efficient? *Applied energy*, 87(10), 3299-3303.
- Nazir, S., & Hameed, T. (2015). Impact of Oil Price and Shocks on Economic Growth of Pakistan: Multivariate Analysis (Sectoral Oil Consumption). *Business and Economics Journal*, 6(4), 1.
- Omag, A. (2012), An observation of the relationship between gold prices and selected financial variables in Turkey, *The Journal of Accounting and Finance*, 2(5), 195 – 206.
- Pakistan Economic Survey. Islamabad: Ministry of Finance, Government of Pakistan.
- A. Patel, S. (2013). Gold as a Strategic Prophecy against Inflation and Exchange Rate. *Business Perspectives and Research*, 2(1), 59-68.
- Perron, P. (1989). The great crash, the oil price shock, and the unit root hypothesis. *Econometrica: Journal of the Econometric Society*, 1361-1401.
- Reboredo, J. C. (2013). Is gold a hedge or safe haven against oil price movements? *Resources Policy*, 38(2), 130-137.
- Ramsey, J. B. (1969). Tests for specification errors in classical linear least-squares regression analysis. *Journal of the Royal Statistical Society: Series B (Methodological)*, 31(2), 350-371.
- Tufail, S., & Batool, S. (2013). An Analysis of the Relationship between Inflation and Gold Prices: Evidence from Pakistan. *Lahore Journal of Economics*, 18(2), 1-35.
- Sadorsky, P. (2000). The empirical relationship between energy futures prices and exchange rates. *Energy Economics*, 22(2), 253-266.
- Sims, C. A. (1986). Are forecasting models usable for policy analysis?. *Quarterly Review*, (Win), 2-16.
- Sims, C. A. (1980). Macroeconomics and reality. *Econometrica: journal of the Econometric Society*, 1-48.
- Stock, J., & Watson, M. W. (1999). Forecasting inflation. *Journal of Monetary Economics*, 44(2), 293–335.
- Subhashini, S. and Poornima. S. (2014), An empirical investigation of the causal relationship between Gold price, Exchange rate and Crude oil price, *International Journal of Management Research and Review*, 4(10). 981 – 987.

- Wang, M. L., Wang, C. P., & Huang, T. Y. (2010). Relationships among oil price, gold price, exchange rate and international stock markets. *International Research Journal of Finance and Economics*, 47(47), 1450-2887.
- Wang, Y. S., & Chueh, Y. L. (2013). Dynamic transmission effects between the interest rate, the US dollar, and gold and crude oil prices. *Economic Modelling*, 30, 792-798.
- Worthington, A. C., & Pahlavani, M. (2007). Gold investment as an inflationary hedge: Cointegration evidence with allowance for endogenous structural breaks. *Applied Financial Economics Letters*, 3(4), 259–262.
- Yaziz, S. R., Azizan, N. A., Ahmad, M. H., & Zakaria, R. (2016). Modelling gold price using ARIMA-TGARCH. *Applied Mathematical Sciences*, 10(28), 1391-1402.
- Zhang, Y. J., & Wei, Y. M. (2010). The crude oil market and the gold market: Evidence for cointegration, causality and price discovery. *Resources Policy*, 35(3), 168-177.
- Zivot, E., & Andrews, D. W. K. (2002). Further evidence on the great crash, the oil-price shock, and the unit-root hypothesis. *Journal of business and economics statistics*, 20(1), 25-44.

IJSER