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THE IMPACT OF OIL PRICE VOLATILITY ON IRAQI ECONOMY 1980-2015

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ABSTRACT

Iraqi economy is suffering from high dependency on oil revenue as the only significant source of financing the economic development and government expenditure. So any fluctuation in oil revenue will be transferred directly into government revenue, and then to its ability to fund economic and development programs, and meet the social responsibilities of being the big employer of Iraq economy. This will make Iraqi economy venerable to any exogenous shock of oil prices.

Our study explores the impact of positive and negative oil price shock on macro variables of the Iraqi economy. We applied the VAR model to estimate the model with three scenarios of shocks. The first one is the historical oil prices and how the Iraqi economy responding to a shock in it. The second model presenting the positive shock of oil real price and the third model is to capture the negative impact of oil real price shock.

We used the Impulse Response Function (IRF) to test the effect of an oil shock on Iraqi macro variables. This will provide us with qualitative measure of the impact of a shock in oil prices on Iraqi economy. To capture the quantitative effect of our VAR models, we employed the Variance Decomposition Analysis. The empirical results show that Iraqi economy is widely opened and venerable to positive and negative oil price shocks.

We concludes that decision makers has to take the diversity of government revenues issue seriously in order to increase Iraqi economy resistant and immunity to oil external shocks.

Keywords: Oil price Volatility, Oil price shock, Economic growth

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1. INTRODUCTION

The effect of oil price volatility will impact both producing and importing oil countries. Many researcher found that the effect of price increase volatility affect the economy of developed oil importing countries adverselySabna (2016), Hamilton (2009). The damage magnitude to their economy is serious due to instability and uncertainty during the oil price volatility duration. It increase the cost of production, increase unemployment, reduce GDP rate of growth, postponing investment decisions about new projects, fueling inflation rate, and affecting the trade balance negatively. While the benefit these countries gaining during down ward oil price volatility are not the same magnitude as the damages incurred during price increase. In other word the effect of oil price volatility is an asymmetric. That means the mechanism that oil price vitality impact the economy is nonlinear.

The impact differs relating to the oil exporting countries in general. The upward volatility means more foreign exchange and hence higher revenue to the government. The government in these countries plays a dominant role in the economic activity. The oil revenue is the most important source of government revenue. Hence any fluctuation of this source will spread a wide impact of macroeconomic variables. During high oil prices, increasing oil revenue, increasing Government expenditures (recurrent and Investment), increasing intermediate and consumption imported goods, appreciation of the exchange rate of the local currency, flourishing of non-traded sectors on the accounts of agriculture and industry sectors, badly allocation of resources, and above all usually accompanied during these times the mismanagement and corrupted practices. At the end of oil booming revenues, we will end up with unsustainable projects, unfinished and can't be completed, loses the competency and competition of the local production sectors due to the import dumping policies, accumulating debts. So according to the Dutch disease theory, a temporary jump in oil revenue will have adverse impact rather than favorite one on the economy. On the other hand, during down word oil price volatility, oil revenue will decline, government revenue will declines, budget deficit is hanging on and threatening the stability of the economy. The government has social and political responsibilities preventing her from cutting the recurring expenditure, but will revert to cutting investment spending considerably leaving unfinished projects of the economic development hanging in the balance, borrowing from local or foreign financial authorities, depreciation of the exchange rate of the local currency. We can say that Economic stability is an important factor to planning and economic development.

The paper structured as follows: part 2 will present literature reviews, part 3 deals with data and methodology, part 4 discuss the econometric mode, part 5 will present empirical results and discussions, part 6will present conclusion.

2. LITERATURE REVIEWS

Many oil exporting countries suffers from the extreme sensitivity towards external shock, specifically oil price shock. Many of them tried to diversify their government revenue and reducing the huge dependency on oil revenue and hence oil prices. Adding to that the lion share of government in economic activity which in turns at the mercy of oil revenue and ultimately oil volatility.

Moshiri, S. (2011) tried to experiment the impact of asymmetric impact of oil volatility in some OPEC members for the 1970-2009, by applying VAR model with a GARCH-type oil price shocks. He concluded that wind fall of foreign exchange during increase oil price volatility did not materialized into sustained higher economic growth. While declining oil prices period resulted on economy stagnation.

Eltonyand Al-Awadi(2001) concluded that oil real price shock is influential factor in explaining the cause of macroeconomic variable instability in Kuwait. They found that government expenditure which is the dynamo of economic activity in Kuwait is highly venerable to oil price shock.

El-Anashasy, et. al (2006) studied the impact of real oil price volatility on Venezuela economy for the period 1950-2001. They used VAR and VECM to determine the short and long-run relationship between oil real prices shock and government revenue, consumption, and public expenditure, and RGDP. They concluded the availability of two long-run relationships between economic growth and fiscal balance and it's vital for the long – run, and short - run as well.

EdesiriOkoro (2014) study the relationships between oil price shock, GDP, oil prices, and oil revenue of Nigeria over 1980-2010. His goal is to determine the effectiveness of volatilityof oil real price on economic growth. He applied VAR method to estimate a nonlinear model. The research concluded that volatility ofoil real price is affected Nigeria economy growthnegatively; the urgent need to set an economic policy to mitigate the Nigeria economy dependencyon oil revenue,and recommended the process of monetization of oil revenue.

Berument, et.al., (2010) try to find how output growth might be impacted by oil price shock in selected MENA nations. They assumed that country economic performance is exogenous to oil prices. They apply VAR model in their estimation. They conclude that oil price shock is positive and significant statistically in effecting GDP of IRAQ, Libya, Oman, Syria, Algeria, and Iran, while appeared to have insignificant effect on outputs of Morocco, Joran, Bahrain, and Egypt.

Farzanegan, and Markwardt (2009) studied the influence of oil real price shock on Iran economy. They used VAR method and found that negative and positive oil real price shock affect inflation positively. Strangely, they concluded that oil real price shock has little or weak impact on real government spending. The Dutch disease Theory seems to be working through the appreciation of the exchange rate of Iranian currency.

Olomola, A., and Adejumo, V., (2006), studied the influence of oil real price volatility on macroeconomic variable (money supply, real exchange rate,output, and inflation rate) on Nigeria employing quarterly set of data 1970 - 2003. The results showed that oil real price volatility does not impact GDP, and inflation rate significantly. However, real exchange rate affected significantly by oil price volatility.

GUNU, U., and KILISHI, A. (2010), researched the effect of oil real price volatility on Nigerian economy. Employing VAR models, their results show that oil real prices have considerable effect on GDP, unemployment, and money supply, while inflation turns to be insignificant.

3. METHODOLOGY

To research the effect that oil real price shocks on Iraqi economy, VAR model has been chosen. The VAR model can be defined as a multivariate umbrella, and variation in a specific variable (oil real price) is connected to variation in itself lags, to variation in other variables,and their lags. The VAR model considers all variables as endogenous, and did not put pre limitation on structural relationsGujarrati, (2003). It is considered as a reduced form model because the VAR used predetermined lagged variables todefine the dependent variable. The stationary of the data will be tested by unit root test, and johansencointegration test will be carried out to explore the existence of longrun relationships as well as the shortrun. The VECM method will be applied in our model estimation if co-integration is existed among the model variables.

The dynamic response of the model variables to a shock in a specific variable (oil real prices) will be carried out employing the simulated of the VECM model IRF (Impulse Response Functions). The IRF simulated functions will measure the effect of oil real price shock on the Iraqi macro-economic variables.

The ability of the variable in causing changes to itself, and tothe value of other variables will be decided as soon as VECM model is estimated. This will be done by VDC which examine the ability of oil price shocks in generating volatility in the rest of the variables of the model.

3.1 Data Definition and Source

Our data is annual and collected from Statistical year book of COSIT and Ministry of Finance, and Iraqi central bank. The data is for the period 1980-2015. We were hoping to collect quarterly data but it was not available especially for the GDP statistics.

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We are going to use Real GDP in dollar, oil price, real exchange rate, total imports, real oil revenue, and oil Shock.

3.2 ECONOMETRIC MODEL

We are going to use VAR method to estimate our general model of order f as follows:

$Yt = m + Ai\sum_{i=1}^{f} Yt\text{-}i + €t$ …….(1)

Where: yt is the vector of the independent variables, Ai is a vector of coefficients, f is number of lags,m is a vector of exogenous variables, and €t is a white nose error vector.

Our first econometric model to be estimated by using unrestricted VAR withCholesky ordering includes OILPRICE, ROILREV, RTGEXP, RGDP, INFLRATE,REXCHRATE, and IMPORTS.

Y_t = [OILPRICE, ROILREV, RTGEXP, RGDP, INFLRATE,REXCHRATE, IMPORTS] …….(2)

Where,

OILPRICE= Oil Price, ROILREV= Real Oil Revenue, RTGEXP = Real Government Expenditure, RGDP = Real Gross Domestic Product, INFLRATE = inflation rate, REXCHRATE= Effective Rate of Exchange, and IMPORTS = Total Imports. A shock in error term €t of equation (1) by one standard deviation, will consider as a shock in the in the IRF first variable which is as equation (2) shows is the OILPR generate variations will generate a variations in all other variables of the model. This is how we going to measure the effect of oil real price shock on the Iraqi Economy. Changing the variables order of Equation (2) might change the dynamic response of the model.

The exogenous vector contains the constant term and dummy variable for the years of instability in the period 1980-2015. This is like the Iraq-Iran war during the 1980's, 1991 First Gulf war, 2001 September 11th, 2003 Regime Changing. So:

M = {constant, Dum1) ……..(3)

In order to explore theAsymmetric Specification or the nonlinearity of the oil real price shock, we will differntiate between the positive as well as the negative oil shocks. We are going to adopt Mork Equation in calculation the oil shock variable Mork (1989) as follows:

PosRoilPRICE = Max(0, ($Oilprice_t$ – $Oilprice_{t-1}$))……(4)

NegROILPRICE = Min(0, ($Oilprice_t$ – $Oilprice_{t-1}$))…….(5)

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The VAR Model to be estimated is the following:

Δ (LRGDP) = $\sum^{f}_{i=1}$ $a^{1}_{11}\Delta RGDP_{t-i}$ + + $a^{0}_{12}\Delta$ (LOilprice) + $\sum^{f}_{i=1}$ $a^{1}_{12}\Delta$ $(LOilprice)_{t-i}$ + $a^{0}_{13}\Delta$ (LRoilrev) + $\sum^{f}_{i=1}$ $a^{1}_{13}\Delta$ $(LRoilrev)_{t-i}$ + $a^{0}_{14}\Delta$ (LRtgexp) + $\sum^{f}_{i=1}$ $a^{1}_{14}\Delta$ $(LRgexp)_{t-i}$ + a^{0}_{15} Δ (Infrate) + $\sum^{f}_{i=1}$ $a^{1}_{15}\Delta$ $(Infrate)_{t-I}$ + $a^{0}_{16}\Delta$ (Exchrate) + $\sum^{f}_{i=1}$ $a^{1}_{16}\Delta$ $(Exchrate)_{t-i}$ + $a^{0}_{17}\Delta$ (LImports) + $\sum^{f}_{i=1}$ $a^{1}_{17}\Delta$ $(LImports)_{t-i}$ +$€_{1t}$ ……….. (6)

Δ (Oilprice) = $\sum^{f}_{i=1}$ $a^{1}_{21}\Delta(Oilprice)_{t-i}$+ + + $a^{0}_{22}\Delta$ (Roilrev) + $\sum^{f}_{i=1}$ $a^{1}_{22}\Delta$ $(Roilrev)_{t-i}$ + $a^{0}_{23}\Delta$ (Rtgexp) + $\sum^{f}_{i=1}$ $a^{1}_{23}\Delta$ $(Rtgexp)_{t-i}$ + a^{0}_{24} ΔRGDP + $\sum^{f}_{i=1}$ $a^{1}_{24}\Delta$ $(RGDP)_{t-i}$ + $a^{0}_{25}\Delta$ (Infrate) + $\sum^{f}_{i=1}$ $a^{1}_{25}\Delta$ $(Infrate)_{t-i}$ + $a^{0}_{26}\Delta$ (Exchrate) + $\sum^{f}_{i=1}$ $a^{1}_{16}\Delta$ $(Exchrate)_{t-i}$+ $a^{0}_{27}\Delta$ (Imports) + $\sum^{f}_{i=1}$ $a^{1}_{17}\Delta$ $(Imports)_{t-i}$ + $€_{2t}$..(7)

Δ (Roilrev) = $\sum^{f}_{i=1}$ $a^{1}_{31}\Delta(Roilrev)_{t-i}$+ + + $a^{0}_{32}\Delta$(oilprice) +$\sum^{f}_{i=1}$ $a^{1}_{32}\Delta(Oilprice)_{t-i}$+ + $a^{0}_{33}\Delta$ (Rtgexp) + $\sum^{f}_{i=1}$ $a^{1}_{33}\Delta$ $(Rtgexp)_{t-i}$ + $a^{0}_{34}\Delta$RGDP + $\sum^{f}_{i=1}$ $a^{1}_{34}\Delta$ $(RGDP)_{t-i}$ + a^{0}_{35} Δ (Infrate) + $\sum^{f}_{i=1}$ $a^{1}_{35}\Delta$ $(Infrate)_{t-i}$ + $a^{0}_{36}\Delta$ (Exchrate) + $\sum^{f}_{i=1}$ $a^{1}_{36}\Delta$ $(Exchrate)_{t-i}$ + $a^{0}_{37}\Delta$ (Imports) + $\sum^{f}_{i=1}$ $a^{1}_{37}\Delta$ $(Imports)_{t-i}$ + $€_{3t}$ …....(8)

Δ (Rtgexp) = $\sum^{f}_{i=1}$ a^{1}_{41} $\Delta(Rtgexp)_{t-i}$ + a^{0}_{42} Δ(oilprice) +$\sum^{f}_{i=1}$ a^{1}_{42} $\Delta(Oilprice)_{t-i}$+ + $a^{0}_{43}\Delta$ (Roilrev) + $\sum^{f}_{i=1}$ $a^{1}_{43}\Delta$ $(Roilrev)_{t-i}$ + $a^{0}_{44}\Delta$RGDP + $\sum^{f}_{i=1}$ $a^{1}_{44}\Delta$ $(RGDP)_{t-i}$ + $a^{0}_{45}\Delta$ (Infrate) + $\sum^{f}_{i=1}$ $a^{1}_{45}\Delta$ $(Infrate)_{t-i}$ + $a^{0}_{46}\Delta$ (Exchrate) + $\sum^{f}_{i=1}$ $a^{1}_{46}\Delta$ $(Exchrate)_{t-i}$ + $a^{0}_{47}\Delta$ (Imports) + $\sum^{f}_{i=1}$ $a^{1}_{47}\Delta$ $(Imports)_{t-i}$ + $€_{4t}$ …....(9)

Δ (Infrate) = $\sum^{f}_{i=1}$ $a^{1}_{51}\Delta(Infrate)_{t-i}$ + $a^{0}_{52}\Delta$(oilprice) +$\sum^{f}_{i=1}$ $a^{1}_{52}\Delta(Oilprice)_{t-i}$+ + $a^{0}_{53}\Delta$ (Roilrev) + $\sum^{f}_{i=1}$ $a^{1}_{53}\Delta$ $(Roilrev)_{t-i}$ + $a^{0}_{54}\Delta$Rtgexp + $\sum^{f}_{i=1}$ $a^{1}_{54}\Delta$ $(Rtgexp)_{t-i}$ + $a^{0}_{54}\Delta$RGDP + $\sum^{f}_{i=1}$

$a^1_{54}\, \Delta\, (RGDP)_{t-i} + a^0_{56}\, \Delta\, (Exchrate) + \sum^f_{i=1} a^1_{56}\, \Delta\, (Exchrate)_{t-i} + a^0_{57}\, \Delta\, (Imports) + \sum^f_{i=1}$

$a^1_{57}\, \Delta\, (Imports)_{t-i} + €_{4t}$ …….(10)

$\Delta\, (Exchrate) = \sum^f_{i=1} a^1_{61}\, \Delta(Exchrate)_{t-i} + a^0_{62}\, \Delta(oilprice) + \sum^f_{i=1} a^1_{62}\, \Delta(Oilprice)_{t-i} + a^0_{63}(Roilrev)$

$+ \sum^f_{i=1} a^1_{63}\, \Delta\, (Roilrev)_{t-i} + a^0_{64}\, \Delta Rtgexp + \sum^f_{i=1} a^1_{64}\, \Delta\, (Rtgexp)_{t-i} + a^0_{65}\, \Delta RGDP$

$+ \sum^f_{i=1} a^1_{65}\, \Delta\, (RGDP)_{t-i} + a^0_{66}\, \Delta\, (Infrate) + \sum^f_{i=1} a^1_{66}\, \Delta\, (Infrate)_{t-i} + a^0_{67}\, \Delta$

$(Imports) + \sum^f_{i=1} a^1_{67}\, \Delta\, (Imports)_{t-i} + €_{4t}$ …….(11)

$\Delta\, (IMPorts) = \sum^f_{i=1} a^1_{71}\, \Delta(IMPorts)_{t-i} + a^0_{72}\, \Delta(oilprice) + \sum^f_{i=1} a^1_{72}\, \Delta(Oilprice)_{t-i} + a^0_{73}(Roilrev)$

$+ \sum^f_{i=1} a^1_{73}\, \Delta\, (Roilrev)_{t-i} + a^0_{74}\, \Delta Rtgexp + \sum^f_{i=1} a^1_{74}\, \Delta\, (Rtgexp)_{t-i} + a^0_{75}\, \Delta RGDP$

$+ \sum^f_{i=1} a^1_{75}\, \Delta\, (RGDP)_{t-i} + a^0_{76}\, \Delta\, (Infrate) + \sum^f_{i=1} a^1_{76}\, \Delta\, (Infrate)_{t-i} + a^0_{77}\, \Delta$

$(Exchrate) + \sum^f_{i=1} a^1_{77}\, \Delta\, (Exchrate)_{t-i} + €_{4t}$ …….(12)

4. ESTIMATION RESULT AND DISCUSSION

The first step of model estimation is to test the stationary ofthe model's variables. Testing for Unit Root is by using ADF test. Table (1) shows the result of the ADF test, where all variables are nonstationary at level form I(0), but turned to be stationary on first difference I(1).The ADF test value is greater than its critical values for 1%, 5%, and 10% respectively, and the Probability is greater than 5%. This means that the null hypothesis of no unit root in the data cannot be rejected or the variable is nonstationary in its level form. Hence the pictures differ when we took the first difference of the variables. The ADF test value is less than the critical value for 5% or 1%, and the probability value is less of 5%. This means the null Hypothesis can be rejected. In other word there is no unit root in the data of the variables.

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Table 1. The ADF unit Root test Results

variables	Integration order	"t-statistics"ADF	Mackinnon CV (1%)	Mackinnon CV (5%)	Probability
LRoilprice	I(0)	-1.91	-3.632	-2.94	0.3241
D LRoilprice	I(1)	-4.994333	-3.63940	-2.95	0.0003
PosLRoilprice	I(0)	-4.572	-3.639	-2.951	0.0009
DposLRoilprice	I(1)	-7.50	-3.65	-2.957	0.0000
NegLRoilprice	I(0)	-5.65	-3.639	-2.95	0.0000
LRoilrev	I(0)	-1.165	-3.639	-2.951	0.6778
DLRoilrev	I(1)	-4.2008	-3.6394	-2.9511	0.0023
LRTGexp	I(0)	-1.2927	-3.639407	-2.951125	0.62
DLRTGexp	I(1)	-3.007167	-3.639407	-2.9511	0.044
LRGDP	I(0)	-0.173156	-3.6329	-2.948404	0.9329
DLRGDP	I(1)	-5.127429	-3.63407	-2.951125	0.0002
LRexchRate	I(0)	-1.945498	-3.639407	-2.951125	0.308
DLRexchRate	I(1)	-2.611809	-3639407	-2.95112 (-2.6143) 10%	0.10
LinfRate	I(0)	-2.898432	-3.6329	-2.948	0.0557

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DLinf Rate	**I(1)**	**-9.060162**	**-3.639407**	**-2.951125**	**0.00**
LRimp orts	**I(0)**	**-1.049542**	**-3.632900**	**-2.9484**	**0.7243**
DLRi mports	**I(1)**	**-5.220978**	**-3.639407**	**-2.951125**	**0.0001**

Next step is to test for co-integrations of the variables. This means to explore the possibility of long term relationships amongthe model variables. Tabl2 (2) shows the results of Johansen test. It shows that there are co-integration of 5 equations of the model. Both Trace statistics test and Max Eigen statistic point to rejection of the null hypothesis of no existence of co-integration among the equations of the model except for the last choice of Table (2) where the Trace statistics and Max-Eigen value is less than thecritical value. The probability is greater of 5% so we will be able to reject the null hypothesis, and admit of the existence of long run relationships among model's variable.

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Table 2. Johansen Co-integration Test

"Sample (adjusted)": 4 36

Observations Included: 33 "after adjustments"
"Trend assumption: Linear deterministic trend"
"Series": LRGDP LROILPRICE LROILREV LRTGEXP LINFRATE LREXCHRATE LIMPORTS
"Lags interval (in first differences): 1 to" 2
"Unrestricted Cointegration Rank Test (Trace)"

"Hypothesized No. of CE(s)"	"Eigenvalue"	"Trace Statistic"	"0.05 Critical Value"	Probability
*None *	0.956916	280.6355	125.6154	0.0000
At most 1 *	0.862752	176.8639	95.75366	0.0000
At most 2 *	0.674919	111.3269	69.81889	0.0000
At most 3 *	0.645533	74.24542	47.85613	0.0000
At most 4 *	0.609288	40.01983	29.79707	0.0024
At most 5	0.237970	9.006910	15.49471	0.3647
At most 6	0.001167	0.038535	3.841466	0.8443

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
"None *	0.956916	103.7717	46.23142	0.0000
At most 1 *	0.862752	65.53696	40.07757	0.0000
At most 2 *	0.674919	37.08149	33.87687	0.0200
At most 3 *	0.645533	34.22559	27.58434	0.0061
At most 4 *	0.609288	31.01292	21.13162	0.0015
At most 5	0.237970	8.968375	14.26460	0.2888
At most 6"	0.001167	0.038535	3.841466	0.8443

"Max-eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values"

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.956916	103.7717	46.23142	0.0000
At most 1 *	0.862752	65.53696	40.07757	0.0000
At most 2 *	0.674919	37.08149	33.87687	0.0200
At most 3 *	0.645533	34.22559	27.58434	0.0061
At most 4 *	0.609288	31.01292	21.13162	0.0015
At most 5	0.237970	8.968375	14.26460	0.2888
At most 6	0.001167	0.038535	3.841466	0.8443

Max-eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

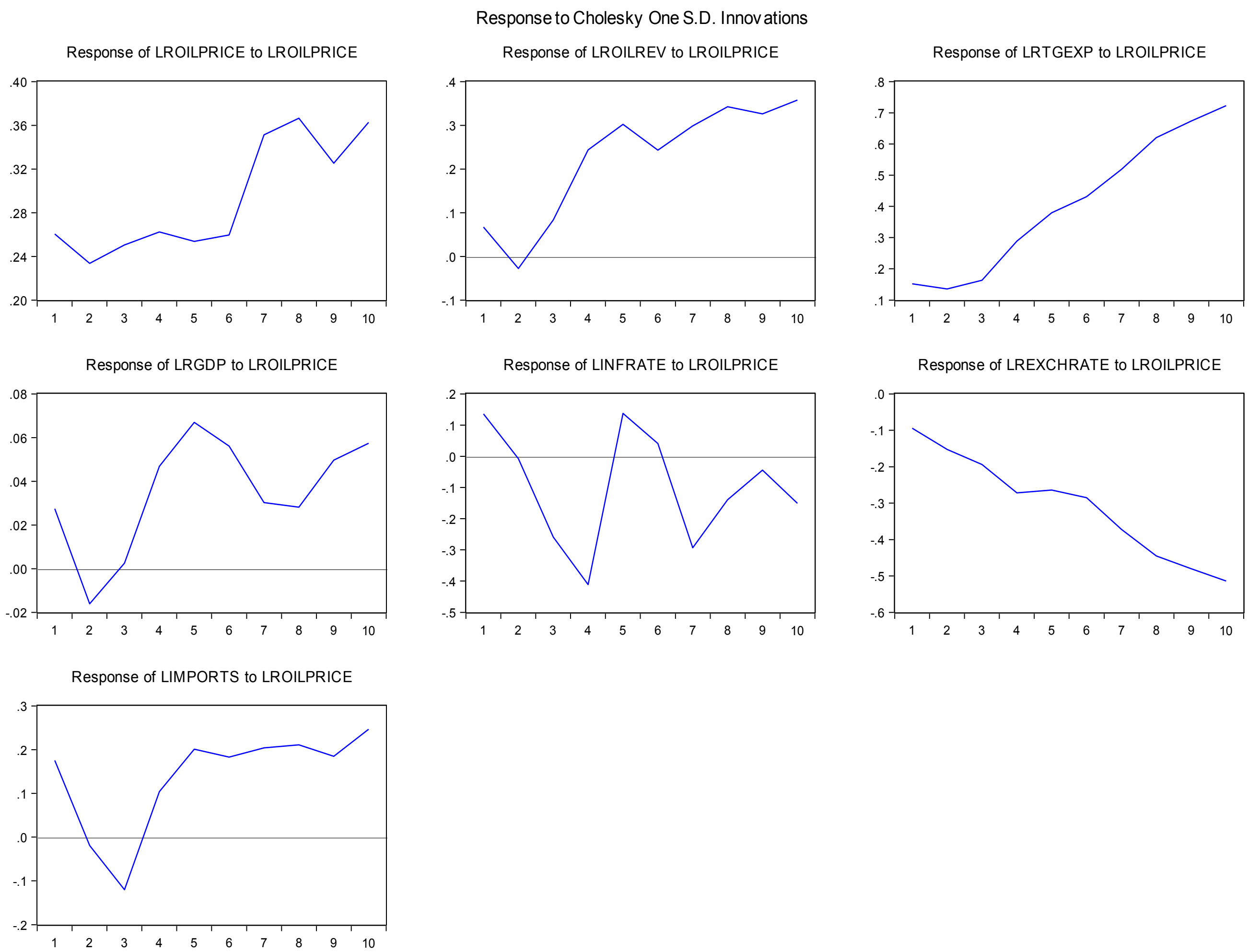
The important step of estimation is to use the VECM model to estimate the model equations, then using Impulse Reflection Function (IRF) with utmost care to the order of the model variables to measure the effect of the oil shock on the Iraqi Macroeconomic Variables. The IRF apply a shock of standard deviation in the innovation term (the $€_{it}$) . This shock is going to measure the effect of a shock in the first variable on other model variables.

The results of the VECM estimation of the model will be presented by appendix (1). The first version of the model is using six independent variables (real oil price, real oil revenue, real total government expenditure, real GDP, Inflation rate, Effective exchange rate, and total imports). The order of the variables in the model is reflect the mechanism that the shock is going to affect the economy. First variable is the real oil price (LROILPRICE). This is the variable that we are going to examine the effect of a standard deviation shock on other independent variables of the model. The second variable chosen is the real oil revenue (ROILREV). The volatility of oil prices will be reflected clearly on real oil revenue magnitudes. The next variable is real total government expenditure. This variable includes recurrent and capital expenditure. The developing countries government used this variable as a proxy of fiscal policy, by which governmentPolicy decision makers can influencethe level of economic activities. The increase in government spending specially during the oil price booming periods, will put more pressures on the scarcity resources available, adding to that the rigidity and weak production local system will push the local inflation rate up. GDP is next in the order of the model. The effective exchange rate will be affected by any change in oil prices. Many researchers found evidences of currency appreciation during the positive oil shocks and the opposite during the negative oil price shock. The last variable is the total import. This variable usually financed by the foreign currency brought by exporting oil. Hence we expect to see this variable following the movement of the oil prices with lag periods.

4.1 Impulse Response Function analysis

Measuring the model sensitivity to an oil price shock by applying the IRF function, will be carried out after estimating the Vector Error Correction Model VECM. Real oil price is the first variable in the order of the VAR model because we want to measure the effect of a shock in it on the Iraqi economy. The results presented in Appendix (1). We used annual date of 37 years and six independent variables. This put limitations on the number of lags we can have in our Subsequent version of the model was used employing a positive and negative oil shock as calculated by equation (3). Appendix (1) presents the result of the VECM model using Real oil prices. The VECM model is highly significant as R^2 value was 0.55.2, 72.2, and 55.2 for real oil price model, positive real oil price, and negative real oil price respectively which reflect the explanatory power of the modelas Appendix 1 shows. VAR and IRF function due to the DF restrictions.

Figure 1. The Impulse Response Function to a shock in Oil Prices



IRF function is used and the results of a standard deviation shock in the innovation term, which mean a shock in oil prices and its effect on the model is presented in Figure (1). The GDP response as graph shows that RGDP response peaked at period 5 and response started to diminish till reach o response in period 7. Real oil revenue, and real total government expenditure shows positive response to a shock in oil prices. Inflation rate response was negative and reaches lower rate at period 3, then started to pick up till it peaked at period 7. The local currency exchange rate is strengthened and reaches its peak on period 9. The total imports responded negatively till period 3 then started to increase till period 7.

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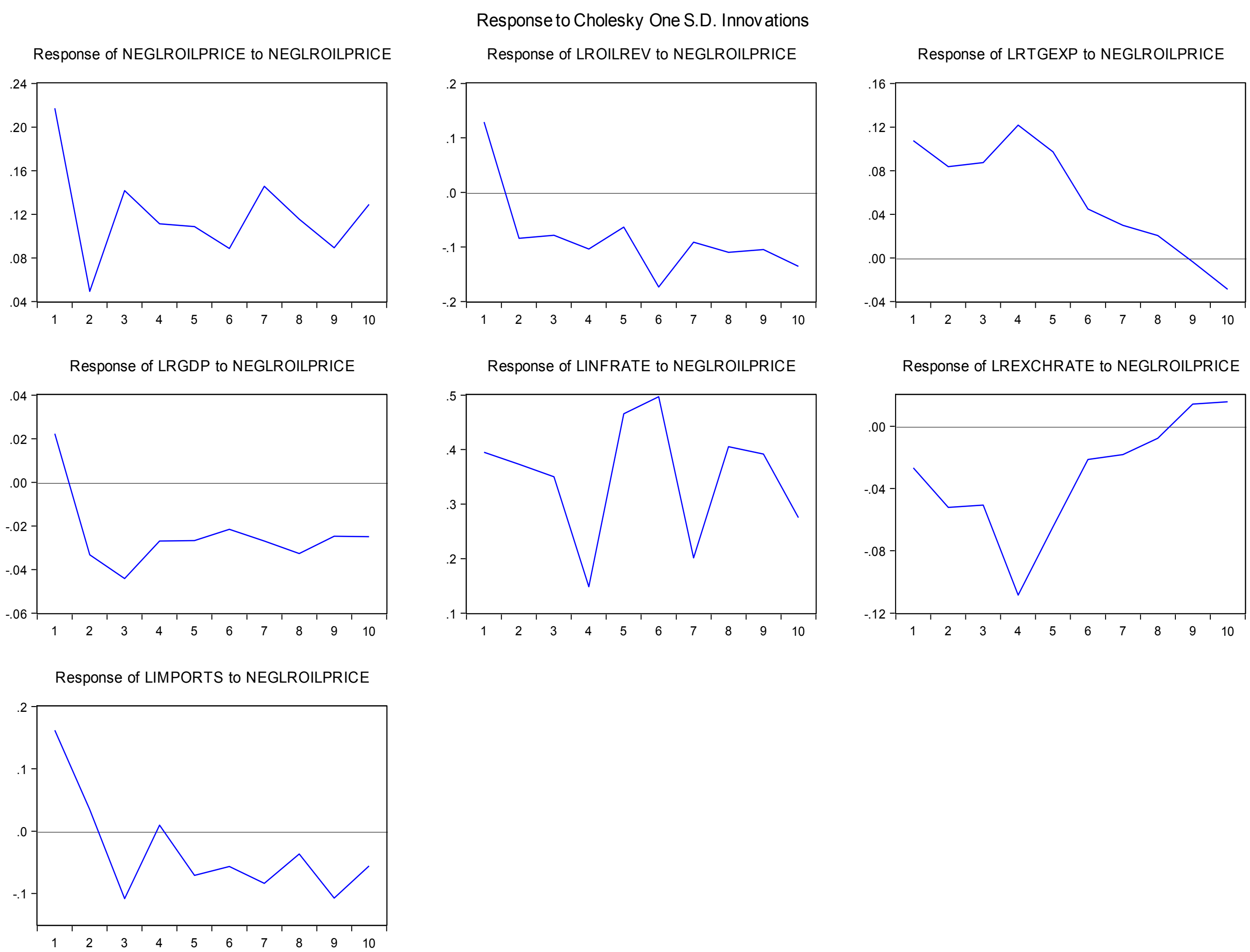
Graph 2 presents the response of the model's variable to a negative shock in oil prices. The RGDP response was negative and diminishing and reaches its lowest fall in period 3. Total imports followed the path of the real GDP. It responded negatively to a negative shock in oil revenue. The total government expenditure stays positive slightly. This might be explained to the social and subsidies responsibilities of the government which cannot be reduced instantly. The government might draw from their foreign reserves or borrowing from local and abroad.

Figure 2. The Impulse Response Function to a Negative shock in Oil Prices



The inflation rate responded as expected negatively coincided with the negative shock in oil revenue and the fall of the GDP. The exchange rate shows slight appreciation of the local currency exchange rate. This might be related to the fall in import.The response of the model to a positive soil price shock is presented in Graph (3). The response of the GDP to positive shock of

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oil prices was positive but diminishing. The decline continued and cross the zero line on period 3. This means that a positive shock in oil prices is not translated to accumulated growth in GDP but to diminishing effect. This is due in Iraq to mismanagement of resources and bad allocation and widely spread corruptions among high government officials. The oil revenue responded positively to the positive shock till the third year and then started to fall till cross the zero line on period 5. Total government expenditure relies to a great degree on oil revenue. So it responded positively to the positive oil shock and continued to increase till year 6, and then started to fall.

Inflation rate started to increase on the first and second years after the shock, then fall to zero on year 3. Exchange rate responded positively to the oil price shock. It appreciated and peaked at year 5. Total imports responded with diminishing but positive movement till it crosses the zero line on year 8.

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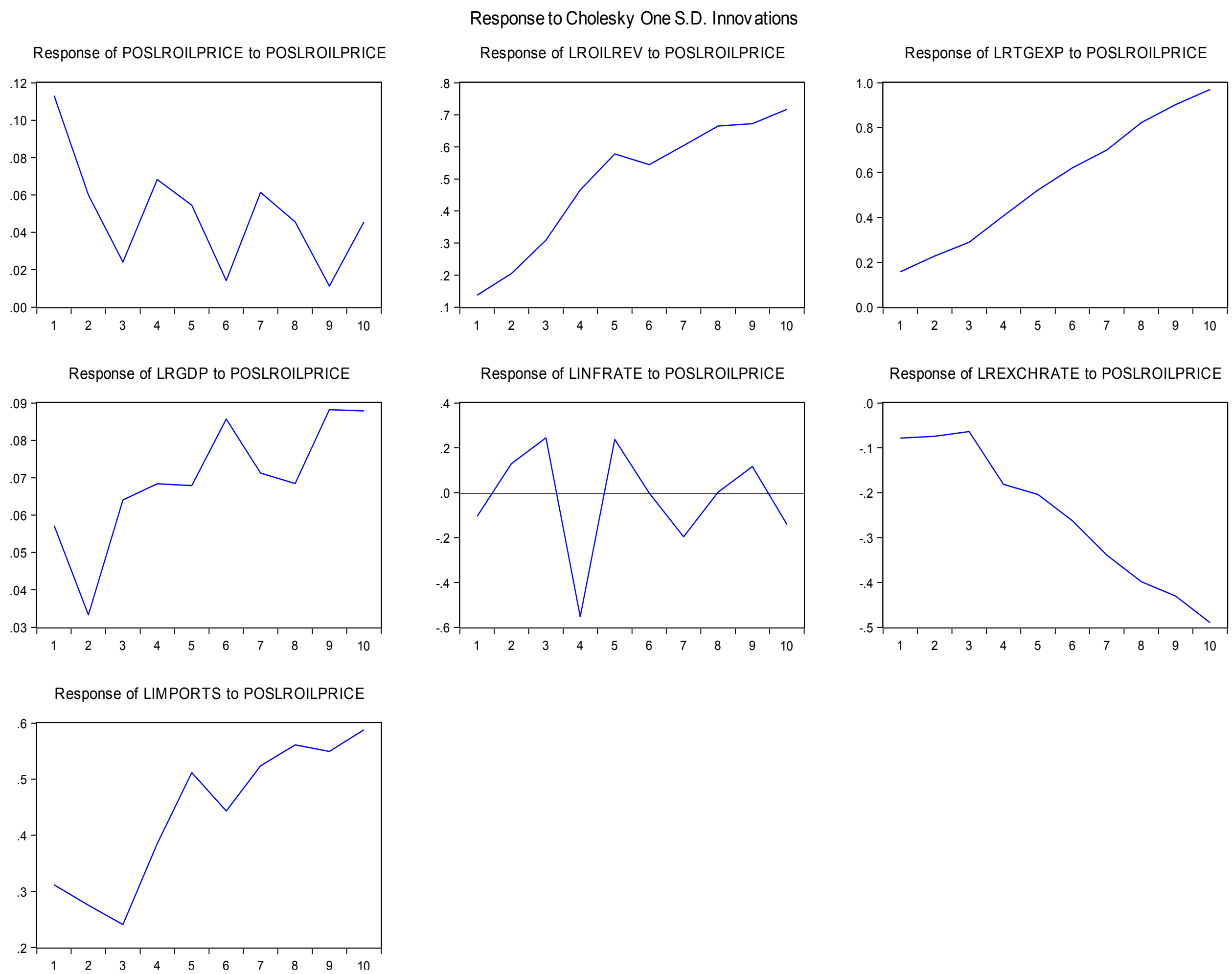
Figure 3. The Impulse Response Function to a shock in Oil Prices



4.2 Variance Decomposition analysis VDA

Our analysis by using the IRF was qualitative. We just describe the graphs which represents the responses of our model variables to a shock in the oil prices. The VDA will allow us to analyze the respond quantitatively. The decomposition of the variance of the furcating error can tell us the relative movements in the variable data that is due to be shock by its own series comparing to the shocks in other variables,

Including oil price. Table 4 shows the decompositions of VECM models variance. The shock of oil prices positively or negatively affected other model variables in different degrees. That means the macro variables of the model respond in different manner to positive oil price shock than to negative oil price shock. This is an indication to the non-linearity of the model or asymmetry phenomenon.

Table 3. Variance decomposition of Positive and Negative Oil Shock

Variance Decomposition of POSLROILPRICE:								
Period	S.E.	POSLROILPRICE	LROILREV	LRTGEXP	LRGDP	LINFRATE	LREXCHRATE	LIMPORTS
1	0.113127	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	*0.217303	*100.0000	*0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.229648	46.68099	2.649949	5.100012	11.44659	21.20634	11.73066	1.185460
	*0.362008	*71.61531	*2.843445	*8.494088	*1.338151	*9.004773	*1.084312	*5.619923
10	0.282210	41.26338	2.008664	4.416114	9.530754	28.29203	12.75454	1.734515
	* 0.466445	*73.91719	*1.922852	*9.438355	*1.744234	*7.411940	*0.809838	*4.755592
Variance Decomposition of LROILREV:								
Period	S.E.	POSLROILPRICE	LROILREV	LRTGEXP	LRGDP	LINFRATE	LREXCHRATE	LIMPORTS
1	0.348976	15.43212	84.56788	0.000000	0.000000	0.000000	0.000000	0.000000
	*0.399275	*10.49127	*89.50873	0.000000	0.000000	0.000000	0.000000	0.000000
5	1.853434	20.57665	12.49770	3.406488	29.64834	2.842320	29.58066	1.447834
	*2.182912	*0.941000	*75.68544	*6.180827	*0.327699	*8.487471	*6.902116	*1.475446
10	3.154993	27.90462	8.199826	1.427175	29.25532	3.553132	28.02185	1.638080
	*3.571453	*0.977593	*74.04643	*7.003562	*0.337815	*8.586526	*7.389887	*1.658184
Variance Decomposition of LRTGEXP:								
Period	S.E.	POSLROILPRICE	LROILREV	LRTGEXP	LRGDP	LINFRATE	LREXCHRATE	LIMPORTS
1	0.358270	19.25662	0.009216	80.73416	0.000000	0.000000	0.000000	0.000000
	*0.281850	*14.57102	*30.21020	*55.21878	0.000000	0.000000	0.000000	0.000000
5	1.578332	24.03179	0.564199	61.95618	12.08502	0.507796	0.741005	0.114003
	*0.821046	*7.486064	*13.85010	*51.63345	*16.48731	*9.460171	*0.403121	*0.679780
10	3.215629	37.81751	0.903392	53.63002	5.535955	1.382953	0.209914	0.520245
	*1.742560	*1.798964	*31.55189	*52.96413	*4.659302	*2.870205	*4.471742	*1.683766
Variance Decomposition of LRGDP:								
Period		POSLROILPRICE	LROILREV	LRTGEXP	LRGDP	LINFRATE	LREXCHRATE	LIMPORTS
1	0.148320	14.89242	16.17860	1.487452	67.44153	0.000000	0.000000	0.000000
	*0.155758	*2.049197	*29.96483	*20.25426	*47.73172	0.000000	0.000000	0.000000
5	0.420598	10.04346	6.870815	2.446681	65.13951	5.180132	9.470855	0.848542
	*0.418928	*2.845759	*49.58205	*9.138167	*25.48151	*7.896186	*1.941742	*3.114581
10	0.610972	13.49394	5.274379	1.300295	64.31901	5.427260	9.297412	0.887702
	*0.591922	*2.423399	*50.64128	*9.527695	*24.21070	*8.033463	*2.145819	*3.017637
Variance Decomposition of LINFRATE:								
Period	S.E.	POSLROILPRICE	LROILREV	LRTGEXP	LRGDP	LINFRATE	LREXCHRATE	LIMPORTS
1	0.830801	1.636584	21.20744	36.12895	0.415935	40.61109	0.000000	0.000000
	*1.165762	*11.47949	*0.001478	*30.99933	*1.049392	*56.47031	0.000000	0.000000
5	1.842088	13.26469	12.61875	29.87243	11.27312	23.50816	8.639337	0.823515

	*1.929995	*17.62680	*6.529732	*31.00959	*2.412118	*37.04601	*1.265710	*4.110045
10	2.473386	8.539303	11.71613	37.92412	12.33901	22.92039	5.755123	0.805923
	*2.621207	*19.46635	*10.36875	*25.80692	*1.827936	*37.64088	*1.723892	*3.165276

Variance Decomposition of LREXCHRATE:

Period	S.E.	POSLROILPRICE	LROILREV	LRTGEXP	LRGDP	LINFRATE	LREXCHRATE	LIMPORTS
1	0.269795	8.361751	10.03617	10.64240	5.017850	21.55290	44.38892	0.000000
	* 0.248482	*1.155016	64.70309	14.10348	6.077931	0.064775	13.89571	0.000000
5	1.361205	4.862818	1.645930	24.76833	30.79125	3.988777	33.93074	0.012160
	*0.911483	*2.639586	*51.71322	*10.79183	*1.750695	*19.41887	*13.28095	*0.404849
10	2.290174	16.36096	0.591395	32.36173	22.21207	5.772629	22.46301	0.238211
	*1.023266	*2.218513	*47.08860	*10.61540	*1.600698	*24.20915	*12.58151	*1.686125

Variance Decomposition of LIMPORTS:

Period	S.E.	POSLROILPRICE	LROILREV	LRTGEXP	LRGDP	LINFRATE	LREXCHRAT E	LIMPORTS
1	0.507308	37.66929	0.052103	30.62993	9.924381	19.74510	0.007084	1.972117
	*0.470347	*11.80921	*2.830059	*59.87685	*3.014534	*1.388162	*0.526490	*20.55470
5	0.470347	11.80921	2.830059	59.87685	3.014534	1.388162	0.526490	20.55470
	*1.161710	*3.269890	*45.31180	*34.20499	*3.532155	*3.675485	*4.852240	*5.153437
10	2.072273	48.30970	6.447203	8.951607	22.81011	1.908608	11.12871	0.444069
	*2.007978	*1.742065	*53.67520	*29.93605	*3.016133	*3.753149	*6.093967	*1.783434

Note: Values with * is the variance decomposition of the negative oil shock model.

Cholesky Ordering: POSLROILPRICE LROILREV LRTGEXP LRGDP LINFRATE LREXCHRATE LIMPORTS

The fluctuation of the RGDP due to the positive and negative oil price shock attributed differently for positive than of negative shock. Positive and negative oil prices does explain 14.89%, 2.049% of the RGDP variation in first year respectively. Real oil revenue does explain 16.2% on positive shock, while on negative shock does explain a 29.96% of the RGDP variations. As Table 4 shows, the positive oil shocks caused about 16.18% in RGDP in the first year and fallen to 5.2% after ten years, while the negative oil price shocks explain 2.05% of the variance in RGDP in the first year and almost stay the same (2.42) for year 10. Hence the greater influence factor in explaining the variation in RGDP due to oil price shocks is its own past shocks and the real oil revenue. As table 4 shows, 67% of the RGDP fluctuation related to the first year GDP shock, and fallen down to 65% in year 5, and to 64% in year 10, while it was 47% in year 1 for the negative shocks and fallen to 25% in year 5, and to 24% in year10. The real oil revenue can strongly explain 16.8%, and 29% in variation of RGD due to positive and negative oil piece shock respectively in the first year of the shock. This relative importance of ROILREV declined to 5%, and increased to 50.6% on year ten for the positive and negative oil shock respectively. This results making sense because oil revenue contributes to more than 40% of the GDP, hence any shock in oil prices will be reflected on the magnitude of the GDP.

Inflation rate (INFRATE) fluctuation can be attributed to its past shock especially in year 1, where its percentage influence reaches 40.6% and 56.47% for positive and negative oil shocks, while it declined to 22.9%, and 37.6% at year 10 respectively. The second important variable explaining the Inflation rate fluctuation is the real total government expenditure (RTGEXP), where it started with 36.1%, and 30.99% in

year 1, and ended with 37.92% and 25.8%in year 10 for both positive and negative oil price shock respectively. This is indicates the dominant role of government expenditure in setting the economic level of activity. Higher or reduced level of government expenditure due to positive or negative oil shock will set the level of inflation for several years later. Oil positive price shock affected RTGEXP directly by 1.6%, 13.26, and 8.54 for year 1, 5, and 10 respectively, while negative shock impacted RTGEXP by 11.48%, 17.6, and 19.46 for year 1,l 5, and ten respectively.

Effective Exchange Rate (REXCHRATE) fluctuations are strongly can be explained byreal oil revenue 10.%, and 64% in year 1, 1.6% and 51.7% for year 5, and 0.59% and 47.1 at year 10 for the positive and negative shock respectively. The second important variable is Total Government Expenditure (RTGEXP), where it can explainsof the fluctuations in real exchange rate by 10%, and 14% in year 1, 24%, 10% in year 5, and 30.79%, and 10.6% in year 10 of positive and negative shock respectively.. The third important variable is its past innovation shock, 44%, 13% in year 1, 33.3%, 13.2 in year 5, and 22.6%, and 12.58% in year 10 for positive and negative shock respectively.

Total import fluctuation due to the positive and negative shocks can be explained by 30.6%, 59.87% at year 1 of total government expenditure respectively the variable, while this effect declined to 8.9%, and 29.93% at year 10. The second important variable is the real oil revenue especially with negative oil shock, where it can explains 2.8%, 45%, and 53% in year 1, 5, and 10 respectively. Positive oil shock was insignificant in explaining the variation in imports. Direct impact of positive and negative shock were able to explain 37%, 11.8 in year 1, 11.81% and 3.2% in year 5, and 48% and 1.7% in year 10 respectively. Its past innovation shock was strong in year 1 (20%) for negative shock, while positive shock got stronger in year 5(20.5), and in year 10 both of them was insignificant. for the positive shock in year 10, while

Real Government Expenditure fluctuations due to positive and negative oil price shock can be attributed to its own past innovation, where in year 1 was 80.7%, and 55%, and went down to 53%, and 52.9 in year 10, respectively. This points out to the inflexible nature of government

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expenditure, which is an indication to the dominant role of government expenditure in Iraqi economy.Positive and negative oil shock can explains 19.25%, and 14.57% in year 1 respectively, then goes up to 37%, and went down to 1.7% in year 10 respectively. Oil revenue effect on RTGEXP was trivial in positive shock (0.009% in year 1, 0.56% in year 5, and 0.9% in year 10), while it was strongly effective in explaining the variation of Real Total Government Expenditure due to negative shock (30.21% in year 1, 13.8% in year 5, and 31.55% in year 10). This is very true due to high dependency of government on real oil revenues to finance its expenditure.

5. CONCLUDING REMARKS

There is scarcity of research on developing exporting countries such as Iraq. One of the limitations of our study is the data limitations especially on quarterly bases.

Oil revenue and hence real government expenditure are venerable to exogenous oil price shock. This will impact all level of economic activity in Iraq given the large weight of government role in economic life. The way that the National budget is formulated by depending on certain base of oil prices, reflect serious dependency of total economic activity and economic development to any exogenous shock in oil prices. This gives an important weight to government expenditure especially under current circumstances of wide corruptions and mismanagement.

There are an asymmetry relationship between oil price shock and economic growth in Iraq, which reflect the non-linearity of our model. The positive oil price shock has far strong effect on most macro variables of our model if it compared with the effect of Negative oil shock. This can be attributed to extra resources available due to oil price increase, which is the main source to finance government expenditure and general level of economic activities. While during the negative shock, government usually reverts to cut unnecessary expenditure, rationalize admin expenditure, and internal and external borrowing to meet the budget deficit.

Most of the macrovariables of the Iraqi economy are impacted by oil price positive or negative shocks. Real exchange rate appreciated during the oil price boom. This will affect the imports considerably by making imports are much cheaper. Adding to that the weak and rigid production system in Iraq will lead to dumping the local market with cheap foreign goods, which will impact the potential development of local private industries negatively.

We can conclude to the vital importance of diversifying the government revenue and revenue generating sectors other than oil. This is a call to take special care of tourism, Industrial, and Agricultural sectors to start putting serious plans to rebuild and developing them. Tourism sector both for religious and cultural and historical purposes can generate considerable foreign currency and create jobs to the locals unemployed youth section of the Iraqi labor force.

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Appendix 1. Estimation Results of VECM Models

Vector Error Correction Estimates
Date: 10/22/16 Time: 14:47
Sample (adjusted): 4 36
Included observations: 33 after adjustments
Standard errors in ( ) & t-statistics in [ ]

CointegratingEq:	CointEq1
LROILPRICE(-1)	1.000000
LROILREV(-1)	0.042404
	(0.02302)
	[1.84205]
LRTGEXP(-1)	-0.339046
	(0.01174)
	[-28.8838]
LRGDP(-1)	0.198231
	(0.14898)
	[1.33060]
LINFRATE(-1)	0.467865
	(0.01955)
	[23.9334]
LREXCHRATE(-1)	0.167960
	(0.01406)
	[11.9467]
LIMPORTS(-1)	0.176654
	(0.03690)
	[4.78756]

C	-7.301383						
Error Correction:	D(LROILPRICE)	D(LROILREV)	D(LRTGEXP)	D(LRGDP)	D(LINFRATE)	D(LREXCHRATE)	D(LIMPORTS)
CointEq1	0.303826	0.795071	0.537113	-0.006360	-3.473268	-0.558980	0.180044
	(0.19056)	(0.32688)	(0.24116)	(0.11154)	(0.47909)	(0.18516)	(0.31629)
	[1.59436]	[2.43229]	[2.22722]	[-0.05702]	[-7.24978]	[-3.01895]	[0.56924]
D(LROILPRICE(-1))	-0.398137	-0.716055	-0.907388	-0.079164	2.925770	0.648859	-1.002014
	(0.33881)	(0.58118)	(0.42877)	(0.19832)	(0.85179)	(0.32920)	(0.56234)
	[-1.17510]	[-1.23208]	[-2.11628]	[-0.39918]	[3.43486]	[1.97103]	[-1.78187]
D(LROILPRICE(-2))	-0.249245	0.009680	-0.442644	0.086376	0.985768	0.414509	-0.766463
	(0.25960)	(0.44530)	(0.32852)	(0.15195)	(0.65264)	(0.25223)	(0.43087)
	[-0.96012]	[0.02174]	[-1.34738]	[0.56844]	[1.51042]	[1.64336]	[-1.77889]
D(LROILREV(-1))	-0.014338	-0.468185	0.422930	0.007959	0.437820	-0.233077	0.855418
	(0.15716)	(0.26958)	(0.19888)	(0.09199)	(0.39510)	(0.15270)	(0.26084)
	[-0.09123]	[-1.73674]	[2.12654]	[0.08652]	[1.10813]	[-1.52639]	[3.27948]
D(LROILREV(-2))	-0.143698	0.003717	-0.025916	0.062921	0.957033	0.090186	0.199052
	(0.13085)	(0.22445)	(0.16559)	(0.07659)	(0.32897)	(0.12714)	(0.21718)
	[-1.09818]	[0.01656]	[-0.15650]	[0.82152]	[2.90921]	[0.70935]	[0.91653]
D(LRTGEXP(-1))	-0.201622	0.681030	0.445237	0.236919	2.290846	0.157652	0.404089
	(0.22261)	(0.38184)	(0.28171)	(0.13030)	(0.55964)	(0.21629)	(0.36947)
	[-0.90574]	[1.78352]	[1.58049]	[1.81828]	[4.09341]	[0.72889]	[1.09370]

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D(LRTGEXP(-2))	0.253264	0.360521	-0.285570	-0.031909	-0.084246	0.140937	-0.278622
	(0.17886)	(0.30681)	(0.22635)	(0.10469)	(0.44967)	(0.17379)	(0.29686)
	[1.41599]	[1.17507]	[-1.26164]	[-0.30478]	[-0.18735]	[0.81098]	[-0.93855]
D(LRGDP(-1))	-0.118875	1.054303	-2.227623	0.103433	-0.473727	1.204610	-0.694004
	(0.55691)	(0.95529)	(0.70477)	(0.32598)	(1.40009)	(0.54111)	(0.92432)
	[-0.21346]	[1.10365]	[-3.16079]	[0.31730]	[-0.33835]	[2.22619]	[-0.75082]
D(LRGDP(-2))	-0.202312	0.577144	0.278796	0.114971	2.006678	0.202984	1.128334
	(0.61106)	(1.04818)	(0.77330)	(0.35768)	(1.53625)	(0.59373)	(1.01421)
	[-0.33108]	[0.55061]	[0.36053]	[0.32144]	[1.30622]	[0.34188]	[1.11252]
D(LINFRATE(-1))	-0.121939	-0.513224	-0.117362	-0.038187	-0.069056	0.002169	-0.043114
	(0.07749)	(0.13292)	(0.09807)	(0.04536)	(0.19482)	(0.07529)	(0.12862)
	[-1.57357]	[-3.86101]	[-1.19677]	[-0.84188]	[-0.35446]	[0.02881]	[-0.33522]
D(LINFRATE(-2))	0.074578	-0.233905	0.061592	-0.046961	0.005968	-0.045613	0.062767
	(0.06482)	(0.11119)	(0.08203)	(0.03794)	(0.16296)	(0.06298)	(0.10758)
	[1.15054]	[-2.10367]	[0.75084]	[-1.23771]	[0.03662]	[-0.72423]	[0.58342]
D(LREXCHRATE(-1))	0.073097	1.478829	-0.113042	0.287470	2.671515	1.040609	-0.289179
	(0.31135)	(0.53408)	(0.39402)	(0.18225)	(0.78276)	(0.30252)	(0.51677)
	[0.23477]	[2.76895]	[-0.28690]	[1.57738]	[3.41296]	[3.43980]	[-0.55959]
D(LREXCHRATE(-2))	-0.158740	0.094338	-0.778307	-0.094916	-1.992677	-0.029198	-0.327647
	(0.26624)	(0.45669)	(0.33693)	(0.15584)	(0.66934)	(0.25869)	(0.44189)
	[-0.59623]	[0.20657]	[-2.31002]	[-0.60907]	[-2.97708]	[-0.11287]	[-0.74147]

D(LIMPORTS(-1))	0.258382	-0.199571	0.177258	-0.159984	0.112494	-0.028689	-0.615066
	(0.18184)	(0.31192)	(0.23012)	(0.10644)	(0.45716)	(0.17668)	(0.30181)
	[1.42091]	[-0.63981]	[0.77028]	[-1.50306]	[0.24607]	[-0.16237]	[-2.03791]
D(LIMPORTS(-2))	0.021384	-0.422250	-0.256125	-0.119080	0.146147	0.061871	-0.466718
	(0.11931)	(0.20465)	(0.15098)	(0.06983)	(0.29995)	(0.11592)	(0.19802)
	[0.17923]	[-2.06324]	[-1.69637]	[-1.70517]	[0.48724]	[0.53372]	[-2.35692]
C	0.056098	-1.189845	0.340896	-0.215321	0.976515	0.294187	-0.259909
	(0.15995)	(0.27436)	(0.20241)	(0.09362)	(0.40212)	(0.15541)	(0.26547)
	[0.35073]	[-4.33672]	[1.68415]	[-2.29988]	[2.42844]	[1.89297]	[-0.97904]
DUM	-0.057186	0.963774	-0.047421	0.250816	-1.970550	-0.484873	0.527744
	(0.14532)	(0.24928)	(0.18391)	(0.08506)	(0.36535)	(0.14120)	(0.24120)
	[-0.39351]	[3.86624]	[-0.25785]	[2.94860]	[-5.39358]	[-3.43392]	[2.18799]
R-squared	0.552943	0.817421	0.758994	0.568365	0.910652	0.858077	0.755318
Adj. R-squared	0.105887	0.634842	0.517989	0.136731	0.821305	0.716154	0.510636
Sum sq. resids	1.086011	3.195487	1.739255	0.372085	6.864111	1.025270	2.991701
S.E. equation	0.260530	0.446898	0.329702	0.152497	0.654986	0.253139	0.432413
F-statistic	1.236853	4.477088	3.149282	1.316775	10.19224	6.046075	3.086937
Log likelihood	9.505963	-8.301301	1.735365	27.17984	-20.91666	10.45563	-7.213990
Akaike AIC	0.454184	1.533412	0.925129	-0.616960	2.297979	0.396629	1.467515
Schwarz SC	1.225112	2.304340	1.696058	0.153968	3.068907	1.167557	2.238443
Mean dependent	-0.014011	0.062801	0.026980	0.040890	-0.100267	0.247809	0.018033
S.D. dependent	0.275525	0.739551	0.474890	0.164130	1.549443	0.475136	0.618135

Determinant resid covariance (dof adj.)	5.83E-10
Determinant resid covariance	3.67E-12
Log likelihood	106.6746

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Akaike information criterion	1.171234
Schwarz criterion	6.885172

Vector Error Correction Estimates
Date: 10/22/16 Time: 14:53
Sample (adjusted): 5 36
Included observations: 32 after adjustments
Standard errors in ( ) & t-statistics in [ ]

CointegratingEq:	CointEq1
POSLROILPRICE(-1)	1.000000
LROILREV(-1)	0.083276 (0.00469) [17.7663]
LRTGEXP(-1)	0.038391 (0.00235) [16.3274]
LRGDP(-1)	0.598734 (0.02786) [21.4942]
LINFRATE(-1)	0.035230 (0.00310) [11.3758]
LREXCHRATE(-1)	-0.064178 (0.00277) [-23.1784]

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LIMPORTS(-1)	-0.343725 (0.00800) [-42.9766]						
C	-4.535688						
Error Correction:	D(POSLROILPRICE)	D(LROILREV)	D(LRTGEXP)	D(LRGDP)	D(LINFRATE)	D(LREXCHRATE)	D(LIMPORTS)
CointEq1	-0.257562 (0.47388) [-0.54352]	5.872132 (1.46182) [4.01700]	2.284797 (1.50075) [1.52244]	0.154468 (0.62130) [0.24862]	-17.40167 (3.48012) [-5.00030]	-1.724163 (1.13014) [-1.52562]	0.011824 (2.12505) [0.00556]
D(POSLROILPRICE(-1))	-0.539019 (0.36323) [-1.48398]	-3.564632 (1.12049) [-3.18133]	-1.797806 (1.15033) [-1.56287]	-0.103776 (0.47622) [-0.21791]	13.74967 (2.66752) [5.15448]	1.717437 (0.86625) [1.98260]	0.063741 (1.62885) [0.03913]
D(POSLROILPRICE(-2))	-0.616038 (0.23138) [-2.66248]	-0.909763 (0.71376) [-1.27461]	-1.324933 (0.73277) [-1.80813]	0.246606 (0.30336) [0.81292]	8.336884 (1.69923) [4.90628]	1.446987 (0.55181) [2.62226]	-0.559398 (1.03759) [-0.53913]
D(LROILREV(-1))	-0.086065 (0.10726) [-0.80243]	-1.232965 (0.33086) [-3.72652]	0.060813 (0.33967) [0.17903]	-0.043098 (0.14062) [-0.30648]	2.502318 (0.78768) [3.17683]	-0.032472 (0.25579) [-0.12695]	0.708182 (0.48098) [1.47239]
D(LROILREV(-2))	-0.073518 (0.07918) [-0.92847]	-0.185119 (0.24426) [-0.75787]	-0.196712 (0.25077) [-0.78444]	0.070580 (0.10382) [0.67986]	2.175577 (0.58151) [3.74123]	0.268748 (0.18884) [1.42314]	0.223805 (0.35509) [0.63028]
D(LRTGEXP(-1))	-0.011680 (0.10880) [-0.10735]	0.654300 (0.33564) [1.94941]	0.249598 (0.34458) [0.72436]	0.265662 (0.14265) [1.86230]	2.926008 (0.79905) [3.66185]	0.270084 (0.25949) [1.04085]	0.227080 (0.48792) [0.46540]
D(LRTGEXP(-2))	0.162934 (0.09076)	0.487598 (0.27999)	0.002115 (0.28745)	-0.064519 (0.11900)	-1.865548 (0.66657)	-0.179307 (0.21646)	-0.231315 (0.40703)

	[1.79512]	[1.74146]	[0.00736]	[-0.54217]	[-2.79871]	[-0.82834]	[-0.56830]
D(LRGDP(-1))	0.183573	-1.576629	-3.356443	0.173079	9.709638	2.402100	-0.312692
	(0.27213)	(0.83948)	(0.86184)	(0.35679)	(1.99853)	(0.64901)	(1.22035)
	[0.67457]	[-1.87810]	[-3.89452]	[0.48510]	[4.85838]	[3.70120]	[-0.25623]
D(LRGDP(-2))	-0.223592	-1.387861	-0.912003	0.044246	7.914725	0.851734	0.479986
	(0.31748)	(0.97938)	(1.00546)	(0.41625)	(2.33158)	(0.75716)	(1.42372)
	[-0.70426]	[-1.41708]	[-0.90705]	[0.10630]	[3.39457]	[1.12490]	[0.33713]
D(LINFRATE(-1))	-0.037981	-0.395010	-0.002441	-0.055037	-0.868936	-0.144141	-0.007033
	(0.02623)	(0.08092)	(0.08307)	(0.03439)	(0.19264)	(0.06256)	(0.11763)
	[-1.44795]	[-4.88163]	[-0.02938]	[-1.60033]	[-4.51070]	[-2.30413]	[-0.05979]
D(LINFRATE(-2))	0.009065	-0.158079	0.120028	-0.053126	-0.309567	-0.101695	0.104876
	(0.02682)	(0.08274)	(0.08494)	(0.03517)	(0.19698)	(0.06397)	(0.12028)
	[0.33796]	[-1.91058]	[1.41305]	[-1.51074]	[-1.57160]	[-1.58984]	[0.87195]
D(LREXCHRATE(-1))	0.313811	1.825348	0.232209	0.326847	1.567267	0.806211	0.083338
	(0.12068)	(0.37229)	(0.38220)	(0.15823)	(0.88630)	(0.28782)	(0.54119)
	[2.60028]	[4.90306]	[0.60756]	[2.06567]	[1.76833]	[2.80112]	[0.15399]
D(LREXCHRATE(-2))	0.045476	-0.026280	-0.579878	-0.147158	-3.385083	-0.344573	-0.315425
	(0.13627)	(0.42035)	(0.43155)	(0.17866)	(1.00073)	(0.32498)	(0.61107)
	[0.33373]	[-0.06252]	[-1.34372]	[-0.82369]	[-3.38263]	[-1.06030]	[-0.51619]
D(LIMPORTS(-1))	0.149890	1.222111	0.967293	-0.152311	-5.205393	-0.694852	-0.492377
	(0.15395)	(0.47491)	(0.48756)	(0.20184)	(1.13061)	(0.36716)	(0.69038)
	[0.97362]	[2.57335]	[1.98396]	[-0.75460]	[-4.60407]	[-1.89253]	[-0.71320]
D(LIMPORTS(-2))	0.116730	0.117344	0.155214	-0.098157	-2.019753	-0.242804	-0.292683
	(0.07883)	(0.24317)	(0.24965)	(0.10335)	(0.57891)	(0.18800)	(0.35350)
	[1.48080]	[0.48256]	[0.62173]	[-0.94974]	[-3.48886]	[-1.29153]	[-0.82796]
C	-0.183883	-0.980045	0.251967	-0.196593	1.063703	0.413175	-0.429714

	(0.07470)	(0.23044)	(0.23657)	(0.09794)	(0.54859)	(0.17815)	(0.33498)
	[-2.46162]	[-4.25301]	[1.06507]	[-2.00731]	[1.93897]	[2.31924]	[-1.28279]
DUM	0.118593	0.900083	0.049044	0.231835	-2.297572	-0.583904	0.650661
	(0.06654)	(0.20526)	(0.21073)	(0.08724)	(0.48866)	(0.15869)	(0.29839)
	[1.78231]	[4.38507]	[0.23274]	[2.65746]	[-4.70177]	[-3.67957]	[2.18058]
R-squared	0.772179	0.895140	0.726944	0.601728	0.865209	0.848795	0.674751
Adj. R-squared	0.529171	0.783289	0.435683	0.176905	0.721432	0.687510	0.327819
Sum sq. resids	0.191966	1.826767	1.925365	0.329984	10.35346	1.091843	3.860414
S.E. equation	0.113127	0.348976	0.358270	0.148320	0.830801	0.269795	0.507308
F-statistic	3.177579	8.002991	2.495856	1.416421	6.017709	5.262703	1.944908
Log likelihood	36.45273	0.404975	-0.436108	27.78510	-27.35138	8.639861	-11.56665
Akaike AIC	-1.215796	1.037189	1.089757	-0.674069	2.771962	0.522509	1.785416
Schwarz SC	-0.437124	1.815861	1.868429	0.104603	3.550634	1.301181	2.564088
Mean dependent	0.000000	0.071556	0.039499	0.046522	-0.096679	0.249541	0.036440
S.D. dependent	0.164867	0.749645	0.476924	0.163484	1.574096	0.482633	0.618768

Determinant resid covariance (dof adj.)	9.32E-11
Determinant resid covariance	4.63E-13
Log likelihood	136.5670
Akaike information criterion	-0.660438
Schwarz criterion	5.110897

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Vector Error Correction Estimates
Date: 10/22/16 Time: 14:55
Sample (adjusted): 5 36
Included observations: 32 after adjustments
Standard errors in ( ) & t-statistics in [ ]

CointegratingEq:	CointEq1
NEGLROILPRICE(-1)	1.000000
LROILREV(-1)	-0.353299 (0.07425) [-4.75815]
LRTGEXP(-1)	0.182781 (0.03947) [4.63100]
LRGDP(-1)	-0.252862 (0.48283) [-0.52371]
LINFRATE(-1)	-0.347223 (0.05342) [-6.49929]
LREXCHRATE(-1)	-0.238737 (0.04815) [-4.95865]

LIMPORTS(-1)	0.049047 (0.13458) [0.36444]
C	6.311847

Error Correction:	D(NEGLROILPRICE)	D(LROILREV)	D(LRTGEXP)	D(LRGDP)	D(LINFRATE)	D(LREXCHRATE)	D(LIMPORTS)
CointEq1	-0.102327	-0.530494	-0.385964	-0.026762	1.109569	0.278163	-0.150693
	(0.08129)	(0.14937)	(0.10544)	(0.05827)	(0.43610)	(0.09296)	(0.17595)
	[-1.25877]	[-3.55164]	[-3.66057]	[-0.45930]	[2.54428]	[2.99245]	[-0.85644]
D(NEGLROILPRICE(-1))	-0.683860	0.381248	-0.058636	-0.129039	0.062172	-0.049282	-0.600826
	(0.27969)	(0.51391)	(0.36277)	(0.20048)	(1.50045)	(0.31982)	(0.60538)
	[-2.44506]	[0.74186]	[-0.16163]	[-0.64366]	[0.04144]	[-0.15409]	[-0.99247]
D(NEGLROILPRICE(-2))	-0.235740	0.530827	-0.017908	-0.017907	0.573962	0.176349	-0.671356
	(0.22726)	(0.41757)	(0.29476)	(0.16289)	(1.21917)	(0.25987)	(0.49190)
	[-1.03732]	[1.27124]	[-0.06075]	[-0.10993]	[0.47078]	[0.67862]	[-1.36483]
D(LROILREV(-1))	-0.013443	-0.612863	0.209514	-0.003512	-0.063990	-0.156314	0.676805
	(0.14399)	(0.26457)	(0.18676)	(0.10321)	(0.77246)	(0.16465)	(0.31166)
	[-0.09336]	[-2.31645]	[1.12183]	[-0.03402]	[-0.08284]	[-0.94937]	[2.17159]
D(LROILREV(-2))	-0.186724	0.087859	-0.151958	0.040506	0.529213	0.117197	0.030870
	(0.11444)	(0.21028)	(0.14843)	(0.08203)	(0.61394)	(0.13086)	(0.24770)
	[-1.63162]	[0.41783]	[-1.02374]	[0.49380]	[0.86199]	[0.89559]	[0.12462]
D(LRTGEXP(-1))	-0.430727	0.373141	0.085030	0.183615	2.431604	0.341323	0.160215
	(0.20284)	(0.37270)	(0.26309)	(0.14539)	(1.08817)	(0.23194)	(0.43904)
	[-2.12349]	[1.00118]	[0.32319]	[1.26290]	[2.23458]	[1.47158]	[0.36492]
D(LRTGEXP(-2))	0.231427	0.453474	-0.199495	-0.028367	-0.537617	0.048128	-0.323889
	(0.15448)	(0.28385)	(0.20037)	(0.11073)	(0.82875)	(0.17665)	(0.33437)

	[1.49808]	[1.59760]	[-0.99564]	[-0.25618]	[-0.64871]	[0.27245]	[-0.96865]
D(LRGDP(-1))	-0.228852	1.069230	-2.129629	0.090404	2.586376	1.422413	-0.572941
	(0.47982)	(0.88162)	(0.62234)	(0.34392)	(2.57407)	(0.54866)	(1.03855)
	[-0.47696]	[1.21280]	[-3.42196]	[0.26286]	[1.00478]	[2.59251]	[-0.55167]
D(LRGDP(-2))	-0.301428	-0.162242	-0.288368	0.053615	3.222717	0.591921	0.988979
	(0.50732)	(0.93216)	(0.65802)	(0.36364)	(2.72163)	(0.58011)	(1.09809)
	[-0.59415]	[-0.17405]	[-0.43824]	[0.14744]	[1.18411]	[1.02035]	[0.90064]
D(LINFRATE(-1))	-0.017571	-0.416840	-0.068206	-0.043986	-0.820766	-0.086984	-0.029860
	(0.05327)	(0.09788)	(0.06909)	(0.03818)	(0.28578)	(0.06091)	(0.11530)
	[-0.32984]	[-4.25870]	[-0.98716]	[-1.15197]	[-2.87204]	[-1.42799]	[-0.25898]
D(LINFRATE(-2))	0.095728	-0.204944	0.071308	-0.048767	-0.378065	-0.079035	0.066897
	(0.05004)	(0.09195)	(0.06491)	(0.03587)	(0.26846)	(0.05722)	(0.10832)
	[1.91294]	[-2.22890]	[1.09862]	[-1.35958]	[-1.40827]	[-1.38119]	[0.61761]
D(LREXCHRATE(-1))	-0.001030	1.722955	0.105866	0.264131	1.505669	0.826462	-0.161083
	(0.24270)	(0.44593)	(0.31479)	(0.17396)	(1.30199)	(0.27752)	(0.52531)
	[-0.00424]	[3.86371]	[0.33631]	[1.51835]	[1.15644]	[2.97805]	[-0.30664]
D(LREXCHRATE(-2))	0.050204	0.208883	-0.551089	-0.085249	-2.357997	-0.206278	-0.121174
	(0.22799)	(0.41891)	(0.29571)	(0.16342)	(1.22308)	(0.26070)	(0.49347)
	[0.22020]	[0.49864]	[-1.86362]	[-0.52167]	[-1.92792]	[-0.79125]	[-0.24555]
D(LIMPORTS(-1))	0.290558	-0.230160	0.333693	-0.140837	-0.319885	-0.148118	-0.441616
	(0.16217)	(0.29796)	(0.21033)	(0.11624)	(0.86996)	(0.18543)	(0.35100)
	[1.79174]	[-0.77244]	[1.58649]	[-1.21165]	[-0.36770]	[-0.79877]	[-1.25816]
D(LIMPORTS(-2))	0.046049	-0.492442	-0.187853	-0.116531	0.302698	0.029576	-0.401083
	(0.10846)	(0.19928)	(0.14067)	(0.07774)	(0.58184)	(0.12402)	(0.23475)
	[0.42458]	[-2.47108]	[-1.33538]	[-1.49898]	[0.52024]	[0.23848]	[-1.70852]
C	0.083891	-1.130215	0.333138	-0.195923	0.714625	0.300381	-0.345799

	(0.13368)	(0.24563)	(0.17339)	(0.09582)	(0.71715)	(0.15286)	(0.28935)
	[0.62755]	[-4.60138]	[1.92134]	[-2.04472]	[0.99648]	[1.96506]	[-1.19510]
DUM	-0.091288	0.839765	-0.108932	0.239289	-1.436462	-0.427706	0.564834
	(0.12080)	(0.22196)	(0.15669)	(0.08659)	(0.64807)	(0.13814)	(0.26147)
	[-0.75568]	[3.78334]	[-0.69522]	[2.76352]	[-2.21653]	[-3.09629]	[2.16019]
R-squared	0.688663	0.862734	0.831007	0.560785	0.734608	0.871742	0.720418
Adj. R-squared	0.356571	0.716318	0.650748	0.092289	0.451524	0.734934	0.422197
Sum sq. resids	0.708310	2.391307	1.191596	0.363908	20.38503	0.926146	3.318389
S.E. equation	0.217303	0.399275	0.281850	0.155758	1.165762	0.248482	0.470347
F-statistic	2.073711	5.892321	4.610073	1.196989	2.595017	6.371988	2.415720
Log likelihood	15.56372	-3.903697	7.241050	26.21941	-38.19107	11.27332	-9.145929
Akaike AIC	0.089767	1.306481	0.609934	-0.576213	3.449442	0.357918	1.634121
Schwarz SC	0.868439	2.085153	1.388607	0.202459	4.228114	1.136590	2.412793
Mean dependent	-0.016363	0.071556	0.039499	0.046522	-0.096679	0.249541	0.036440
S.D. dependent	0.270904	0.749645	0.476924	0.163484	1.574096	0.482633	0.618768

Determinant resid covariance (dof adj.)	1.02E-09
Determinant resid covariance	5.10E-12
Log likelihood	98.19922
Akaike information criterion	1.737549
Schwarz criterion	7.508884